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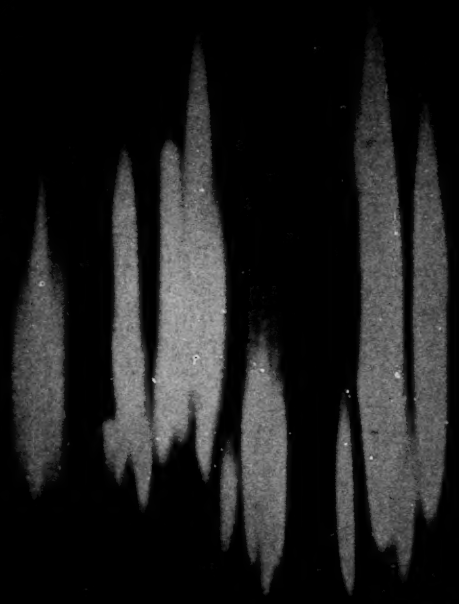
JULY 15, 1981

PIPELINE & GAS JOURNAL

ENERGY CONSTRUCTION, TRANSPORTATION & DISTRIBUTION



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ENERGY OPERATIONS & EQUIPMENT FORECAST

July 15, 1981

PIPELINE & GAS JOURNAL

– Photo courtesy of Sandia National Laboratories

ABOUT THE COVER: The name of the game is energy – and the world's energy firms continue to expand the search for both conventional and unconventional (even exotic) energy sources. Cover photo, made during studies of combustion at Sandia National Laboratories near Albuquerque, NM, symbolizes the final objective of energy exploration, production and transportation.

1 Overview of Oil/Gas Operations, Supply/Demand and Technical Advances

Editors focus on trends in rig activity, drilling/production technology, worldwide pipeline projects, U.S. gas supply and the international energy hunt.

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by Rich McNally, Associate Editor, PETROLEUM ENGINEER INTERNATIONAL

Operators Looking Everywhere for More Production
by W.B. Bleakley, Editor, PETROLEUM ENGINEER INTERNATIONAL

Pipeline Construction Activity Rated High
by Dean Hale, Editor, PIPELINE & GAS JOURNAL

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It's easy to get information quickly on any item of equipment, or services mentioned in this book. Just circle the number of the ad or item on one of the prepaid cards in front and back, and mail it to us. Our computer center forwards your inquiry to the appropriate company.

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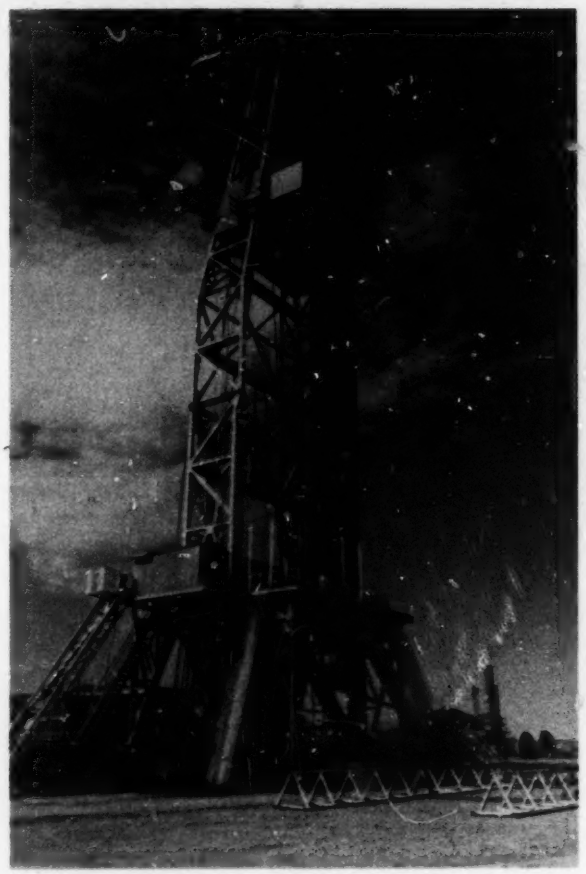
Rotary Rigs Reflect Response To Decontrol

by Rich McNally, *Associate Editor*
PETROLEUM ENGINEER International



Rowan Co.'s Rig 5 drilling the year's deepest well, GHK Co.'s 26,500-ft Harrell No. 1 and 2, in western Oklahoma.

Keeping up with the '80s will be no problem for America's oil and gas well drillers. But will the '80s be able to keep up with them?

By setting a new record for completions last year, U.S. drillers began the century's penultimate decade in high gear, and are showing no signs of slowing down as higher prices for domestic crude oil and for some categories of natural gas encourage close to 9000 oil and gas operators to employ the services of more than 700 contract drillers.

Last year, U.S. drilling contractors put down 189 million feet of hole to complete 62,462 wells. This represented a 19% increase over 1979's footage and a 21% increase over the earlier year's completion total.

As impressive as these figures are, however, they pale in comparison to cost data. Petroleum Information Corp. (Denver) puts 1980 drilling costs at $19.5 billion, a 41% increase over the $13.8 billion spent during 1979. And 1981 budgets are even higher, with 70,000 to 74,000 wells predicted for this year. This would bring drilling expenditures up to the $30 billion level for the year and continue a trend that could very well see a trillion dollars spent to drill and complete wells in the U.S. during the decade of the '80s.

Decontrol of oil prices, therefore, is achieving just about what the industry said it would. Higher prices and the promise of improved returns for investors have extended and expanded the search for new energy. The industry is not only going farther offshore, it also has begun exploring the complex structures of the Appalachian Basin as well as the Western Overthrust Belt. And exploration is going deeper in the conventional basins of Texas, Oklahoma, California, and Louisiana.

Although decontrol was a long time in coming, the delay provided the oilfield supply industry with plenty of time in which to gear up for the current boom. As a result, lead times associated with some of the major items of oilfield equipment are not regarded as serious enough to constrain drilling activity.

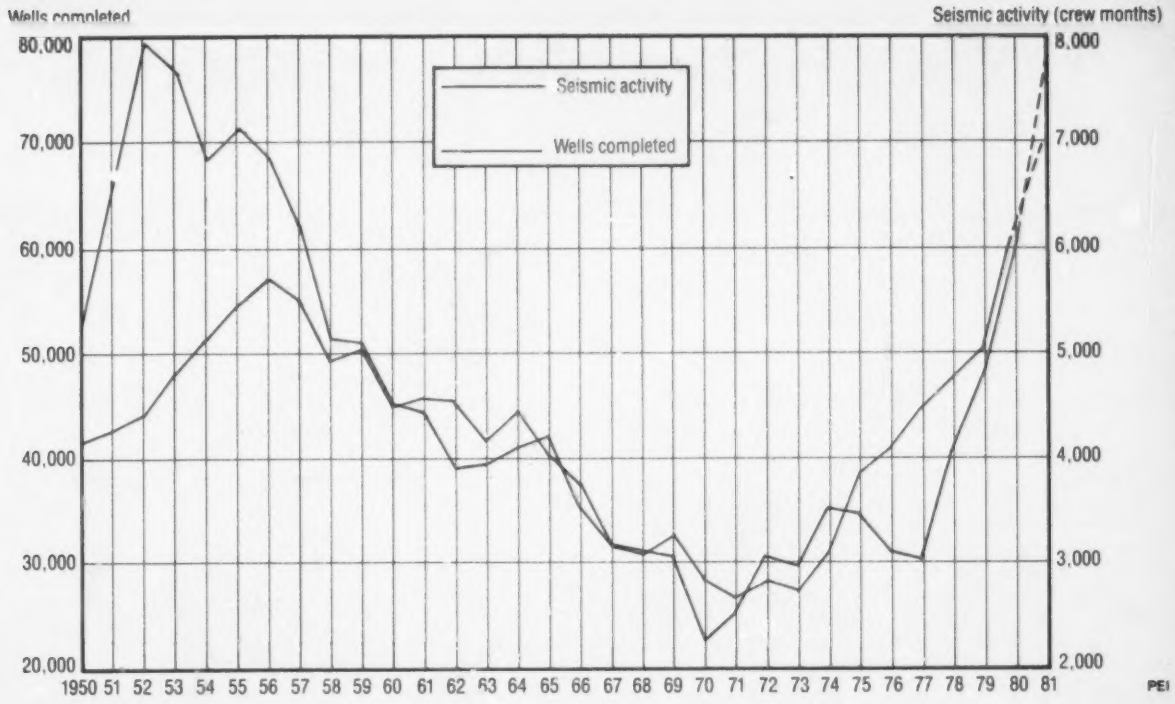
Perhaps the most critical constraints during the mini-booms of the '70s were shortages of oil country tubular goods, but indications are that domestic shipments plus imports will be sufficient to meet requirements for at least the first half of the '80s. Lone Star Steel Co. looks for drillers to consume 7.5 million tons of tubulars in 1985 while drilling 525 million feet of hole with 5740 rigs. Lone Star is one of a number of steel companies that have announced expansion plans during the past year (others include Armco and U.S. Steel), which should provide the necessary additional tubular capacity for the second half of the decade.

Shortages of qualified personnel were another constraint on drilling during the '70s, but it is not something that the industry hasn't been able to overcome. At one point early in the decade, the U.S. active rig count actually dropped below 1000, but today the industry is adding that many rigs each year. And it is coming up with the people to man them. Where they are coming from is anybody's guess, but the word we get from Wyoming is that the drilling boom in that state's portion of the Overthrust Belt is accompanied by a shortage of cowboys, who apparently are trading in their Stetsons and lassos for hard hats and spinning chains.

Drilling contractors, meanwhile, are stepping up their on-the-job training efforts, and there is growing interest in training simulators that will do the same job without sacrificing valuable rig time.

Although today's rig-building boom could result in a certain amount of overcapacity within the next few years, there appears to be little danger of overproduction of such consumable items as drilling bits, electronic logs, and drilling muds.

The contract research and development firm Gorham International Inc. of Gorham, Me., says that the future demand for mud minerals is "very bullish because drilling rates are up sharply, and because every well drilled requires 300 to 500



Close correlation between drilling and seismic activity is illustrated in this graph which shows both activities at their highest levels in 30 years.

tons of drilling fluid, regardless of whether that well is dry or becomes a gusher."

Rotary drilling is here to stay, for the foreseeable future at least, but a number of interesting bit developments are expected to have a definite impact on the drilling scene before long. Mud motors, for example, have been a staple in directional drilling for years, but motors available today are powerful enough for intensive long-term use, and there is growing interest in their ability to drill straight through tilted formations.

Another bit development that is attracting the attention of drilling contractors around the country is the artificial diamond blanks that offer both the hardness and abrasion-resistance of diamond and the impact-resistance of tungsten carbide. Bits with the Stratapax teeth are an added factor in the renewed popularity of mud motors for straight hole drilling because they require less weight in the drill string and less power on the bit.

So, things seem to be going the industry's way for a change. The U.S. drilling rig fleet now numbers more then 4000, with well over 3800 actively at work at mid-year. If the federal government chooses to continue lifting its heavy hand–repeal the "windfall profits" tax, for example, and throw out complicated and inconsistent restrictions on natural gas pricing – most industry authorities agree that the drilling effort will continue to surge.

With market forces in command, the industry would have the incentive to drill 100,000 wells each year for 40 years, according to George P. Mitchell, president of Mitchell Energy & Development Corp. "And when we're drilling at the rate of 100,000–an amount the nation's geology can support," Mitchell says, "OPEC's clout will be softened beyond recognition. In the year just ended, with a record number of wells, we stopped the downward trend in oil production and almost did it in gas production. In the present year (1981), I believe the industry will drill 10,000 more wells than in 1980. And when we reach an annual rate of 85,000 wells a year, we'll find as much natural gas as we're using."

Another call for removal of restraints on energy production comes from Charles J. DiBona, president of the American Petroleum Institute. He says, "For the country to take full advantage of the stimulus that market forces are giving to drilling, there must be some changes in government policy.

"To cut imports in half by 1990," he says, "there is need for more energy from federal lands, a better balance between environmental progress and resource development, and consistent, timely government decisions on nuclear regulatory questions."

The leading indicator of future drilling activity, of course, is the number of seismic crews active at any one time. Here, too, the outlook can only be described as bullish. Word just in from the Society of Exploration Geophysicists reflects a dramatic increase in the number of seismic land crews and marine vessels searching for oil and gas in the U.S. and offshore. The total increased from 610 in March to 645 during April, the highest total since the third quarter of 1953. This represents a 30% increase over April 1980, and 79% over April 1979.

All signals are "go" for drilling in the '80s – even without repeal of the "windfall profits" tax, because institutional investors from outside the industry stand ready to pick up the slack by investing in oil and gas exploration as a means of keeping pace with inflation.

The petroleum industry is ready, willing, and able to fuel the U.S. economy through what promises to be a turbulent decade. The only question is whether the '80s will come through with the proper climate for the necessary drilling effort. An effort which will not only be expensive, but which will set new standards for equipment, technology, and people. ■

Pipeline Construction Activity Rated High

by Dean Hale, *Editor, PIPELINE & GAS JOURNAL*

At mid-1981 over 81,000 miles of crude oil, refined products, natural gas, and slurry pipelines are planned or under construction around the world. More than $12.3 billion will be spent during the year to install an estimated 23,990 miles of cross-country pipelines of all types.

In the United States, that includes 10,440 miles of liquids and gas pipelines costing more than $2.52 billion. Outside the U.S., some 13,550 miles of new pipelines will be installed at a cost exceeding $9.7 billion.

The trend for the remaining two decades of this century is for more and more–more pipelines of all kinds to transport an increasing number of commodities. Those commodities include the perennial favorites – crude oil, refined products, natural gas liquids, natural gas, and coal slurries–plus chemicals of all types, ammonia, industrial gases such as oxygen and nitrogen, carbon dioxide (to be used for enhanced recovery of oil), solids slurries including ores and other non-soluble minerals, and even such items as wood chips.

In a major study of U.S. and Canadian pipeline requirements to the turn of the century, Bechtel's Peter G. Behr and Steven Davenport *(see Pipeline & Gas Journal, June 1981)* estimate a minimum of 33 major inter-regional pipeline projects, involving 50,300 miles, will be needed by the year 2000. This projection includes 8 oil pipeline projects totalling 8900 miles; 11 gas pipeline projects totalling 26,000 miles, and 14 slurry pipeline projects totalling 15,400 miles.

PIPELINE & GAS JOURNAL estimates that some 200,000 total miles of new cross-country pipelines will be needed during the 1981 to 2000 period–including major interregional lines, intra-regional lines, loops on existing systems, additional offshore pipelines, and gathering system lines – an average of 10,000 miles per year.

"Super projects" such as the Alaska Highway Gas Pipeline Project will continue to capture the spotlight, but the bread-and-butter pipeline activity will keep the manufacturers of pipe, valves, fittings, pumps, compressors, coatings, and construction machinery in business and help pay the bills.

Internationally, pipeline activity continues to grind away at a steady pace with many new, moderately sized projects announced, plus a few undertakings somewhat more grandiose. Nigeria, frustrated by an inability to get a long-planned LNG export plant and terminal built or financed, now proposes to build a 2500-mile, 40 to 48-in. gas pipeline across western Africa from the Bonny area to the Mediterranean, with branches connecting to either (or both) the Trans-Mediterranean Gas Pipeline and the SEGAMO project proposed to Spain and France (involving a very deep line across the Mediterranean).

In West Germany, two liquid lines are in the news — an 81-mile, 22-in. crude oil line from Wilhelmshaven to Hamburg, proposed by Esso AG and Deutsche BP, and a 186-mile LPG line from Wilhelmshaven to the Ruhr, planned by Mobil Oil AG and Industrieverwaltangs GmbH.

Crude oil and products lines occupy headlines elsewhere. In Panama, work is underway and pipe ordered for a 78-mile, 36-in. line across the Isthmus that will permit bypassing of the crowded Panama Canal. In Colombia, ECOPETROL is planning a 186-mile, $47 million crude line. In Australia, a 240-mile crude oil and condensate line is now planned from Moomba in the Cooper Basin to Stoney Point in South Australia, site of a new refinery. New Zealand is the site for a $55 million, 101-mile products line from Marsden Point to Auckland.

Argentina, where 1240 miles of 30-in. and smaller lines are now under construction, is planning another 1000 miles of 30-in. and larger system to feed natural gas to Sao Paulo, Brazil, and to several Uruguayan cities as part of a massive export program. The Soviet Oil and Gas Ministry has announced that it will build 31,000 miles of gas pipelines during 1981-1985, most of them in western Siberia; the plan does not include the 2000-mile, $11 billion Yamul Peninsula-to-Europe project currently being studied and promoted.

In the North Sea, work is underway on 44 miles of 24-in. from the West Sole Field to Easington, U.K., and government, British Gas, and private interests continue to debate the merits of a 600-mile major offshore gas gathering system. Success of the gas gathering system would depend, partially, on whether Norway will commit gas from the Statfjord re-

1981 Pipeline Construction

(Estimated Miles Completed During Year)

	U. S.	International	Total
Gas			
Transmission	3610	3177	6787
Field, Gathering, Storage	1850	1950	3800
Total	**5460**	**5127**	**10587**
Crude			
Trunk	412	2860	3272
Gathering	1590	1800	3390
Total	**2002**	**4660**	**6662**
Products			
Refined Products	785	1090	1875
LPG/NGL	1380	1545	2925
Total	**2165**	**2635**	**4800**
Offshore			
Oil	181	518	699
Gas	634	610	1244
Total	**815**	**1128**	**1943**
GRAND TOTAL	**10,442**	**13,550**	**23,992**
Prime Movers (Est. HP Installed)			
Compressor	401,000	720,000	1,121,000
Pump	228,800	183,000	411,800
Total	**629,800**	**903,000**	**1,532,800**

serves. Norway, on the other hand, is carefully studying its options, including building a major gas pipeline link to Ekofisk (with gas then going to Emden via an existing gas pipeline) and a gas pipeline across the Norwegian Trench to the Norwegian mainland. Whatever happens must happen by 1985-86, at which time the reinjection of gas into the Statfjord reservoir will have to be discontinued to prevent damage to the formation.

British Gas currently is completing work on the remainder of its 280-mile, 42-in. Fourth Feeder from St. Fergus *(see May 1981 issue of P&GJ)*. In Italy, crews are working on six major sections of the 48-in. Trans-Mediterranean Gas Pipeline for SNAM and plan to have the line complete to the Rome area by year's end.

In Brazil, work continues on the 280 miles of 12 through 24-in. being installed at Campos Basin. In Mexico, Pemex has 342 miles of major 48-in. gas pipeline underway, and another 2667 miles of various sizes of gas and products lines. In Spain, ENAGAS has announced plans for a 155-mile gas pipeline south of Madrid to Catagena and Marcia and a 150-mile line from Madrid to Burgos. Kuwait has announced plans for some 60 miles of new offshore/onshore gas pipelines.

Victoria Gas & Fuel Corp. of New Zealand has announced plans for 55 miles of 30-in. gas line to be completed by 1983. In Australia, work will get underway in January on the 81-mile, 36-in. pipeline to bring Northwest Shelf gas to shore. Meanwhile, planning and design work continues on the 940-mile 26 or 30-in. pipeline that will take the gas from near Dampier southward to Perth.

Pipeline activity in the Middle East has slowed somewhat, with completion of the Petromin 48-in. crude oil line (800 miles) and the Aramco 747-mile NGL line, both terminating at Yanbu on the Red Sea. In Abu Dhabi, work is nearing completion on ZADCO's 746 miles of 4 to 48-in. Several major gas and NGL lines in Algeria are under construction, with completion dates varying from fall 1981 to late 1982.

Domestically, the "big" project—the Alaska Highway Gas Pipeline—has its "below the border" sections well underway, plus a substantial amount of work in progress in Alberta, British Columbia, and Saskatchewan. The 161-mile western leg (Pacific Gas Transmission) will be complete by late summer and the 823-mile Northern Border Pipeline from Ventura, Iowa to Monchy, Sask. will be ready by year's end. Nova Corp. has 395 miles of 42-in. underway on its eastern leg from Monchy, Sask., to Caroline, Alta.

The big pipeline, now estimated to cost $30 billion, reports progress in obtaining financing. Three major gas producers at Prudhoe Bay–Exxon, ARCO, and Sohio–will have a 30% ownership in the line. Design of the huge gas processing plant at Prudhoe Bay, a major step in getting the line into operation, is well underway by the Parsons Co. of Pasadena, Calif.

Numerous new gas pipeline projects have been announced as exploration and drilling around the nation turn up substantial new reserves. El Paso Natural Gas is building 107 miles of 20-in. and adding 3500 hp that will give it access to considerable reserves in the Anadarko Basin. American Natural is planning a 375-mile, 24-in. "Pathfinder" pipeline from near Cheyenne, Wyo. southeast to Greensburg, Kansas. The Trailblazer pipeline project–797 miles of 30 and 36-in. to move Overthrust Belt gas from the Wyoming-Utah-Colorado area to Midwest markets, remains on tap, as do the Rocky Mountain Pipeline (695 miles of 20, 30, and 36-in.) proposed by Pacific Gas Transmission, and the Trans-Anadarko Pipeline System involving 635 miles of 36-in.

Northwest Pipeline Co. has completed 340 miles of 24 and 30-in., while Florida Gas is awaiting approval on 309 miles of 30-in. loops on its system, and Colorado Interstate Gas Co. is planning 300 miles of 26 and 30-in. loops on its system. Boundary Gas Co., to be built and operated by Tennessee Gas Pipeline and owned by 14 gas companies, is planning 294 miles of 10, 12, 26 and 30-in.

Northern Tier Pipeline expects action this year on its proposal to build a 1550-mile, 40 and 42-in. crude oil line from the Seattle area to Clearbrook, Minn. Western Crude Oil of Denver is building 115 miles of 10-in. from Medford, Okla., to Conway, Kan., and another 47 miles of line in South Texas near Giddings.

Energy Transportation Systems, Inc. expects to receive its final EIS from the Bureau of Land Management in late July. The ETSI system is in the final design stage and ROW acquisition is underway. Work on the coal slurry line is expected to begin in 1982.

Canadian pipeline activity is at its best in recent years. In addition to the nearly 400 miles of 42-in. underway by Nova on the Alaska Highway Gas Pipeline Project, TransCanada PipeLines has 64 miles of 48-in. loop underway and plans another 221 miles of 42 and 48-in. loop later this year. First stage of the Quebec and Maritimes gas line–100 miles of 30-in. – may also be underway this year. TransCanada also has proposed a 235-mile, 42-in. "shortcut" from North Bay to Morrisburg (southeast of Ottawa) that may see action this year.

British Columbia Hydro has won approval for a 212-mile, 12, 16, and 24-in. system to bring gas from the mainland to Vancouver Island at a cost of $231 million. Not to be forgotten is the Polar Gas Project, involving some 2300 miles of 36 to 48-in. pipeline, that is still under study.

Liquids pipelines projects include a dual 89-mile system from Lloydminster to Cold Lake for Husky Oil involving a 6-in. condensate line and a 12-in. heavy oil + condensate return line. Similarly, Alberta Energy will build a dual 145-mile system from Cold Lake to Edmonton, also with a 6-in. condensate line and a 12-in. heavy oil + condensate return line.

Alberta Products Pipeline is currently building a 196-mile, 10-in. products line from Edmonton to Calgary. Dome Petroleum, Westcoast Transmission, and Canadian Occidental Petroleum Ltd. reportedly are planning a 500-mile, 10-in. line to transport NGL from Prince George, B.C. to Prince Rupert and Kitimat, B.C. And, finally, approval has been given for a $360 million crude oil line from Norman Wells to Northern Alberta, to be built by Interprovincial Pipeline.■

Gas Distribution Growth Continues

by Jim Watts, *Assistant Editor,* *Pipeline & Gas Journal*

Statistics can be confusing, but the trend of figures relating to gas distribution tell an easy-to-read story: customers, industrial as well as residential, realize gas is efficient, available, and all in all, very cheap for the price.

Residential demand is still good, despite a depressed new housing market due to high interest rates, and conversions are high as more and more customers move away from expensive oil and electricity. Gas utilities will add 650,000 to 750,000 customers during 1981, down from the 820,000 added during 1980. More than $2.019 billion will be spent during the year on 29,219 miles of new distribution piping and outlays for maintenance of the nation's 1.35 million miles of existing services. Total number of customers served as of Dec. 31, 1980, was more than 46.7 million.

The 1981 estimate is 13.05% higher than the $1.786 billion spent for new and replacement mains and services and system maintenance in 1980, and expenditures in 1980 were a record 14.6% higher than the expenditures in 1979 of $1.558 billion. Increasing budgets reflect demand for gas energy in an economy that still has to pick itself up, and also that inflation is continuing to add to the burden of paying for ever more expensive labor, materials, and construction equipment.

One of the ways the industry is fighting inflation is with plastic pipe, which is cheaper than steel pipe and can be installed easier and without highly specialized skills, such as welding. More than 78% of all the pipe installed in 1980 was plastic, the seventh year in a row that plastic pipe accounted for more than half the pipe installed. In 1981, utilities plan to install 22,234 miles of plastic pipe to add to the 176,087 miles currently in the ground.

American Gas Association's latest capital expenditures outlook anticipates more than $401 billion in gas industry expenditures between 1981 and 2000, of which a projected $124 billion (or more than $6 billion a year) will go into construction and maintenance of cross-country pipelines and utility mains and services.

Peakshaving supplies are ample to protect the 46.7 million customers, 38 million of whom heat their homes with natural gas. Underground gas storage, propane-air, peakshaving LNG, and other supplemental fuels totaled 71.68 Bcf during the 1980-81 winter, up from 69.86 Bcf in the 1979-80 winter. Major U.S. utilities such as Southern California Gas Co., Columbia Gas System, El Paso Natural Gas Co., and others will spend nearly $328.1 million in 1981 for underground gas storage and related facilities. ■

U.S. GAS DISTRIBUTION PIPING — 1980-1989

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Projection										
Miles of Gas Mains Installed	13,573	13,744	14,900	14,800	14,400	14,600	14,200	14,200	14,700	15,100
Miles of Gas Services Installed	14,379	15,475	14,200	14,600	14,700	15,000	15,600	15,550	15,900	15,900
Total	**27,952**	**29,219**	**29,100**	**29,400**	**29,100**	**29,600**	**29,800**	**29,750**	**30,600**	**31,000**
Construction Expenditures, Distribution ($Billion)	1.781	2.019	2.381	2.646	2.967	3.402	3.870	4.299	4.872	5.370

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THE P&GJ 500

Details On The 500 Leading Companies Transporting Energy Through Pipelines

PIPELINE & GAS JOURNAL

International Pipeline & Gas Utility Design, Construction & Operation

Published Continuously Since 1859

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The P&GJ 500

Dimensions Of The 500 Leading Companies Transporting Energy Through Pipelines

by Dean Hale, *Editor*

America's energy pipeline network is vast and growing. It reaches into every nook and cranny of the 48 contiguous states plus Alaska and Hawaii. There are over 2000 owner/operator entities involving more than 1,448,000 miles of gas mains, gas transmission pipelines, and liquid pipelines.

To provide a more definitive reading of the dimensions of this great resource, PIPELINE & GAS JOURNAL has surveyed the leading firms operating these facilities to determine the 300 leading gas distribution utilities, the 100 leading gas transmission pipelines, and the 100 leading liquid (crude oil and products) pipelines.

The P&GJ 500 represent the leaders; they operate 74.4% of all liquids pipeline mileage, 78.2% of all gas pipeline mileage, and serve 97.3% of the nation's gas utility customers.

Dimensionally, the P&GJ 500 study provides a comparative insight covering revenues, gas sales (in MMcf per year), number of customers, net income, plant value, capital expenditures in terms of plant additions, and physical facilities in terms of miles of gas mains or miles of pipelines.

Gas Distribution Utilities. The nation's leading 300 gas distribution utilities covered in the P&GJ 500 report range in size from 3,793,062 customers to 4,043 customers. The top 300 (out of a total 1559 gas utilities in the U.S.) operate 657,984 miles of gas main – some 80.2% of the estimated 820,200 miles now in service.

California leads the top 300 list – Southern California Gas Co. is No. 1 in customers, sales, and miles of main. Pacific Gas & Electric, is No. 2 in the list.

Gas Transmission Pipelines. Largest in terms of total miles operated is InterNorth, Inc., followed by El Paso Natural Gas Co., which ranks No. 1 in gas sales and operating revenues. Tenneco, Inc. is No. 2 in sales. In capital expenditures, InterNorth ranks first, followed by Michigan Wisconsin Pipe Line Co.

Liquids Pipelines. In terms of mileage, Amoco Pipe Line Co. is No 1 with 12,924 miles, followed by Mobil Pipe Line Co. Leader in crude oil deliveries is Arco Pipe Line Co., followed by Exxon Pipe Line Co. Colonial Pipe Line Co., operator of the nation's major products system from Houston to New Jersey, ranks first in products deliveries, followed by Buckeye Pipe Line Co.

The following summary tables provide an overview of the "top 10" companies in numerous categories; the complete tabular presentations provide a fuller dimensional measure of the P&GJ 500.

The 10 Biggest Spenders – Gas Distribution Utilities
(not including integrated companies)

Rank	Company Name	1980 Additions To Plant, $(000)
1	Northern Illinois Gas Co.	125,261
2	Southern California Gas Co.	119,036
3	Columbia Gas Distribution Companies	53,426
4	Consolidated Edison Co. of NY	45,772
5	Brooklyn Union Gas Co.	44,792
6	Public Service Gas & Electric	44,415
7	Peoples Gas Light & Coke Co.	43,871
8	Philadelphia Electric	38,833
9	Atlanta Gas Light Co.	32,413
10	Northwest Natural Gas Co.	30,638

The 10 Biggest Spenders – Gas Transmission Pipelines
(not including integrated companies)

Rank	Company Name	1980 Additions To Plant, $(000)
1	Internorth, Inc.	238,122
2	Michigan Wisconsin Pipeline Co.	232,207
3	Transcontinental Gas Pipeline Corp.	144,553
4	Columbia Gas Transmission Co.	138,697
5	Tenneco, Inc.	121,612
6	Natural Gas Pipeline Co. of America	106,348
7	Panhandle Eastern Pipeline Co.	102,352
8	Trunkline Gas Co.	97,406
9	Southern Natural Gas Co.	93,947
10	United Gas Pipeline Co.	85,229

The 10 Biggest Spenders – Liquids Pipeline Companies

Rank	Company Name	1980 Additions To Plant, $(000)
1	Colonial Pipeline Co.	140,633
2	MAPCO	112,696
3	Arco Pipe Line Co.	87,278
4	Wood River Pipeline Corp.	71,651
5	Phillips Pipe Line Co.	70,411
6	Exxon Pipeline Co.	58,917
7	Sohio Pipeline Co.	43,168
8	Amoco Pipeline Co.	33,757
9	Shell Pipe Line Co.	29,622
10	Gulf Refining Co.	23,556

The Top 10 In Revenues – Gas Distribution Utilities

Rank	Company Name	1980 Revenues, $(000)
1	Southern California Gas Co.	3,197,436
2	Public Service Electric & Gas	2,994,053
3	Columbia Gas Distribution Companies	2,015,984
4	Consolidated Gas Supply Corp.	1,708,937
5	Northern Illinois Gas Co.	1,578,022
6	Northern Indiana Public Service Co.	1,366,525
7	Baltimore Gas & Electric Co.	1,226,442
8	Peoples Gas Light & Coke Co.	1,117,613
9	Public Service Co. of Colorado	1,058,942
10	Illinois Power Co.	883,370

The Top 10 Gas Distribution Utilities In Miles of Main

Rank	Company Name	Miles of Main
1	Southern California Gas Co.	34,412
2	Pacific Gas & Electric Co.	29,319
3	Columbia Gas Distribution Companies	27,320
4	Northern Illinois Gas Co.	23,602
5	Entex	21,208
6	Consumers Power Co.	19,224
7	Atlanta Gas Light Co.	16,069
8	Arkansas Louisiana Gas Co.	14,425
9	East Ohio Gas Co.	13,382
10	National Fuel Gas Distribution Co.	12,686

The Top 10 In Revenues – Gas Transmission Pipelines

Rank	Company Name	1980 Revenues $(000)
1	El Paso Natural Gas Co.	2,932,489
2	Columbia Gas Transmission Co.	2,822,340
3	Tenneco, Inc.	2,552,637
4	Transcontinental Gas Pipe Line Corp.	2,536,088
5	United Gas Pipe Line Co.	2,462,826
6	Texas Eastern Transmission Corp.	2,068,579
7	Michigan Wisconsin Pipe Line Co.	1,951,108
8	Internorth, Inc.	1,739,805
9	Panhandle Eastern Pipeline Co.	1,515,496
10	Texas Gas Transmission Corp.	1,353,725

The Top 10 Gas Distribution Utilities In MMcf Gas Sales

Rank	Company Name	1980 Sales MMcf
1	Southern California Gas Company	883,263
2	Pacific Gas & Electric Co.	797,755
3	Columbia Gas Distribution Companies	733,227
4	Lone Star Gas Company	545,916
5	Northern Illinois Gas Co.	486,169
6	Michigan Consolidated Gas Co.	426,851
7	Boston Gas Company	403,400
8	Consumers Power Co.	340,763
9	East Ohio Gas Co.	329,900
10	Peoples Gas Light & Coke Co.	307,938

The 10 Largest Combination Gas & Electric Utilities

(Ranked By Number of Gas Customers)

Rank	Company Name	No. of Customers	MMcf Sales	Miles of Mains
1	Pacific Gas & Elec. Co.	2,858,129	797,755	29,319
2	Public Service Elec. & Gas	1,306,952	197,970	12,369
3	Consumers Power Co.	1,138,109	340,763	19,224
4	Cons. Edison of N.Y.	1,024,003	83,941	4,197
5	Public Service of Colo.	627,267	167,994	10,435
6	Northern Indiana Publ. Serv.	521,770	255,730	10,457
7	Baltimore Gas & Elec. Co.	510,451	95,110	4,235
8	San Diego Gas & Elec.	504,016	88,483	4,938
9	Niagara Mohawk Power	423,035	101,321	6,063
10	Long Island Lighting	387,310	43,625	5,676

The Top 10 Gas Transmission Pipelines In MMcf Gas Sales

Rank	Company Name	1980 Sales MMcf
1	Columbia Gulf Transmission Co.	1,410,448
2	El Paso Natural Gas Co.	1,181,133
3	Tenneco, Inc.	1,113,322
4	Columbia Gas Transmission Co.	1,068,265
5	United Gas Pipeline Co.	1,020,879
6	Texas Eastern Transmission Corp.	931,250
7	Transcontinental Gas Pipeline Corp.	890,583
8	Internorth, Inc.	755,302
9	Michigan Wisconsin Pipeline Co.	674,855
10	Panhandle Eastern Pipeline Co.	664,987

The 10 Largest Integrated Gas Utilities

Rank	Company Name	No. of Customers	MMcf Sales	Miles of Mains	Miles of Trans. Lines	Additions To Plant $(000), 1980
1	Pacific Gas & Electric Co.	2,858,129	797,755	29,319	4,765	135,832
2	Lone Star Gas Co. (Enserch)	1,174,686	545,916	2,736	11,480	61,391
3	Consumers Power Co.	1,138,109	340,763	19,224	1,244	61,430
4	Michigan Consolidated Gas Co.	1,056,357	426,851	12,616	2,312	74,641
5	Arkansas Louisiana Gas Co.	703,152	301,449	14,425	9,028	81,406
6	National Fuel Gas Distribution Corp.	667,868	193,685	12,686	1,517	36,741
7	Oklahoma Natural Gas (Oneok, Inc.)	586,151	274,663	9,965	4,896	35,579
8	Mountain Fuel Supply	395,586	140,320	11,587	1,764	61,516
9	Southwest Gas Corp.	335,102	98,500	6,900	1,571	19,872
10	Pioneer Corp.	275,000	163,408	4,278	11,118	7,921

The Top 10 Liquids Pipelines – Revenues

Rank	Company Name	1980 Revenues $(000)
1	Sohio Pipeline Co.	1,151,533
2	Arco Pipeline Co.	833,733
3	Exxon Pipe Line Co.	790,968
4	BP Pipelines Inc.*	556,820
5	Colonial Pipeline Co.	338,353
6	Mobil Alaska Pipeline*	167,224
7	Amoco Pipeline Co.	143,425
8	Lakehead Pipeline Co.	136,709
9	Williams Pipe Line Co.	132,486
10	Shell Pipe Line Co.	119,890

*Represents firm's share of trans-Alaska oil pipeline (Alyeska) revenues.

The Top 10 Liquids Pipelines – In Mileage

Rank	Company Name	Total Miles Of Pipeline
1	Amoco Pipeline Co.	12,924
2	Mobil Pipeline Co.	11,783
3	Exxon Pipeline Co.	9,063
4	Williams Pipe Line Co.	8,273
5	Arco Pipeline Co.	8,208
6	Shell Pipe Line Co.	7,828
7	MAPCO	7,606
8	Continental Pipe Line Co.	7,489
9	Phillips Pipe Line Co.	5,932
10	Colonial Pipeline Co.	5,194

The Top 10 Products Pipeline Companies

Rank	Company Name	1980 Deliveries, (000) Bbl Products
1	Colonial Pipeline Co.	632,497
2	Buckeye Pipeline Co.	281,624
3	Gulf Refining Co.	233,199
4	Southern Pacific Pipelines, Inc.	227,338
5	Marathon Pipeline Co.	183,966
6	Plantation Pipeline Co.	182,250
7	Texas Pipeline Co.	161,368
8	Williams Pipe Line Co.	161,203
9	Arco Pipeline Co.	145,281
10	MAPCO	131,346

The Top 10 Crude Pipelines

Rank	Company Name	1980 Deliveries, (000) Bbl Crude
1	Arco Pipeline Co.	520,105
2	Exxon Pipeline Co.	497,235
3	Lakehead Pipeline Co.	461,018
4	Shell Pipeline Co.	393,904
5	Amoco Pipeline Co.	387,187
6	Marathon Pipeline Co.	320,567
7	Texas Pipeline Co.	314,716
8	Sohio Pipeline Co.	269,771
9	Gulf Refining Co.	260,216
10	Mobil Pipeline Co.	256,388

The 300 Leading Gas Distribution Utilities

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
1	Southern Calif. Gas Co.	3,793,062	883,263	3,197,436	58,623	1,085,880	119,036	34,412	36,008
2	Pacific Gas & Electric Co.	2,858,129	797,755	2,947,009	135,867	2,130,917	125,394	29,319	23,304
3	Columbia Gas Distribution Cos.	1,840,589	733,287	2,015,984	44,500	657,337	53,436	27,320	N/A
4	Northern Illinois Gas Co.	1,441,606	486,169	1,578,022	72,767	1,553,585	125,261	23,602	18,996
5	Public Service Electric & Gas Co.	1,306,952	197,970	2,994,053[E]	281,716	1,000,222	44,415	12,369	12,274
6	Entex, Inc.	1,180,676	178,057	824,068	39,335	430,076	31,000	21,208	N/A
7	Lone Star Gas Co.	1,174,686	545,916	1,435,430	52,905	748,724	61,391	2,736	16,483
8	Consumers Power Co.	1,138,109	340,763	981,350	65,427	1,195,296	61,430	19,224	N/A
9	Brooklyn Union Gas	1,061,208	107,248	688,253	38,932	624,479	44,792	3,788	5,217
10	Michigan Consolidated Gas Co.	1,056,357	426,851	1,414,787	14,863	1,342,445	74,461	12,616	13,827
11	Consolidated Edison Co. of NY, Inc.	1,024,003	83,941	460,846	34,668	554,130	45,772	4,197	2,395
12	East Ohio Gas Co.[A]	980,013	329,900	1,100,031	N/A	428,079	N/A	13,382	N/A
13	The Peoples Gas Light & Coke Co.	884,085	307,938	1,117,613	30,731	889,566	43,871	4,042	5,123
14	The Gas Service Co.	842,460	224,167	539,112	7,663	260,400	24,261	12,670	5,423
15	Atlanta Gas Light Co.	794,202	227,213	699,544	16,473	495,677	32,413	16,069	14,209

Footnotes:
A. 1979 data
B. Estimated
C. Fiscal year ending 6-30-80
D. Fiscal year ending 9-30-80
E. Gas and electric revenues combined.
F. Fiscal year ending 3-31-81.

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
16	Arkansas Louisiana Gas Co.	703,152	301,449	801,897	73,426	897,825	81,406	14,425	N/A
17	National Fuel Gas Dist. Corp.	667,868	193,685	691,073	8,177	416,961	36,741	12,686	N/A
18	Public Service Co. of Colorado	657,267	167,994	1,058,942[E]	85,027	304,868	17,041	10,435	N/A
19	Oklahoma Natural Gas Co.	586,151	274,665	860,054	40,279	507,252	35,579	9,965	1,618
20	Southern Union Gas Co.	564,260	185,646	372,249	N/A	N/A	N/A	1,586	N/A
21	Minnesota Gas Co.	558,358	151,034	435,091	17,700	338,106	22,138	7,758	N/A
22	Washington Gas Light Co.	554,342	110,164	463,995	18,086	607,049	57,162	5,762	N/A
23	Philadelphia Gas Works	540,289	86,538	289,720	N/A	N/A	N/A	2,932	3,207
24	Laclede Gas Co.[D]	540,138	120,143	423,842	15,692	377,152	16,124	5,957	5,656
25	Northern Indiana Public Serv. Co.	521,770	255,730	1,366,525[E]	72,230	572,590	33,334	10,457	9,844
26	Baltimore Gas & Electric Co.	510,451	95,110	1,226,442[E]	139,399	332,829	18,272	4,235	4,401
27	San Diego Gas & Electric Co.	504,016	88,483	299,036	16,563	154,297	18,930	4,938	4,028
28	Boston Gas Co.	477,812	403,400	368,952	19,097	304,529	16,569	5,700	7,540[3]
29	Niagara Mohawk Power Corp.	423,035	101,321	383,648	15,244	404,290	29,653	6,063	3,910
30	Wisconsin Gas Co.	404,467	127,112	450,284	13,327	357,040	15,872	5,900	N/A
31	Mountain Fuel Supply Co.	395,586	140,320	399,595	30,851	532,688	57,621	11,587	N/A
32	Long Island Lighting Co.	387,310	43,625	182,990	N/A	N/A	N/A	5,676	5,027
33	Illinois Power Co.	381,849	97,728	883,370[E]	113,562	327,991	18,406	7,109	4,940
34	Alabama Gas Corp.	352,479	89,413	295,958	5,258	111,668	8,993	6,094	6,907
35	Arizona Public Service Co.	340,248	43,227	143,895	5,530	38,366	17,692	6,201	3,926
36	Southwest Gas Corp.	335,102	98,500	317,549	8,861	306,200	19,872	6,900[B]	N/A
37	Peoples Natural Gas Co.	315,000	120,476	328,219	N/A	N/A	N/A	2,339	4,771
38	Cincinnati Gas & Electric Co.	300,581	87,023	879,445[E]	89,980	179,100	14,125	3,407	813
39	Indiana Gas Co.	291,320	96,560	224,759	18,946	246,738	16,402	6,229	4,460
40	Peoples Natural Gas Div., Internorth	291,058	16,351	399,956	5,530	126,012	20,000	9,617	3,396
41	Philadelphia Electric Co.	283,789	69,114	290,743	22,511	332,599	38,833	4,269	2,979
42	Pioneer Corp.	275,000	163,408	559,452	90,556	278,901	7,921	4,278	564
43	Northern States Power Co.	270,299	71,123	233,809	9,925	227,648	25,079	4,003	2,892
44	The Dayton Power and Light Co.	263,835	58,024	650,000[E]	64,171	75,047	7,087	3,770	733
45	San Antonio City Public Service Board	263,012	26,710	87,147	41,195	100,614	7,992	3,315	3,030
46	Equitable Gas	258,858	82,315	293,703	35,698	338,809	26,549	3,325	N/A
47	Washington Natural Gas Co.	244,322	623,000	292,174	6,885	274,320	23,287	5,805	5,651
48	Northwest Natural Gas Co.	236,849	72,415	335,610	13,714	324,678	30,638	7,674	4,400
49	Louisville Gas & Electric Co.	232,739	58,307	443,893[E]	42,113	132,989	4,973	3,127	N/A
50	Louisiana Gas Service Co.	232,158	22,224	76,400	747	60,663	8,261	3,579	2,539
51	Iowa Power & Light Co.	229,845	4,350	297,933	26,784	93,321	4,845	2,001	2,023
52	Memphis Light, Gas & Water	225,335	68,450	172,698	6,908	107,644	9,853	2,898	1,936
53	Iowa-Illinois Gas & Electric Co.	222,665	68,408	211,477	10,613	161,205	10,050	3,446	2,563
54	N.J. Natural Gas Co.	221,478	44,220	176,841	7,006	160,558	12,350	4,262	3,696
55	Bay State Gas Co.	217,485	40,871	209,613	8,775	209,609	—	3,717	N/A
56	Rochester Gas & Electric Corp.	213,157	42,362	502,425[E]	43,651	181,145	11,440	3,224	2,565
57	Mississippi Valley Gas Co.	212,939	57,436	170,867	4,833	91,252	4,267	4,295	N/A
58	Wisconsin Natural Gas Co.	212,282	75,850	259,519	5,323	140,322	14,139	4,148	2,785
59	Kansas-Nebraska Natural Gas	203,000	133,816	371,607	21,870	446,550	43,285	12,847	3,272
60	Citizens Gas & Coke Utility	202,975	53,178	144,693	1,582	216,423	32,305	3,182	4,111

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
61	UGI	197,426	61,250	234,717	17,671	220,920	26,124	3,241	1,988
62	Elizabethtown Gas	191,001	34,964	162,815	7,188	136,892	14,203	2,074	1,763
63	Piedmont Natural Gas Co., Inc.	190,682	65,073	222,171	9,275	190,738	17,483	5,036	N/A
64	South Jersey Gas Co.	189,000	3,472	150,819	12,527	136,242	22,659	—	—
65	Central Illinois Light Co.	183,477	48,453	394,821[E]	29,695	183,806	17,658	3,157	2,743
66	Peoples Gas System, Inc. (Tampa)[A]	182,500	41,600	138,000	4,000	93,000	7,000	—	—
67	New Orleans Public Service Inc.	176,500	27,600	79,680	14,760	71,873	2,751	1,423[A]	—
68	South Carolina Electric & Gas Co.	166,470	48,734	630,746[E]	63,700	143,712	6,051	4,230	3,472
69	Montana Dakota Utilities	165,000	44,430	118,676	6,143	252,998	21,000	2,992	N/A
70	Northeast Utilities	150,394	27,546	145,384	5,964	185,285	19,903	2,209	1,244
71	Wisconsin Public Service Corp.	149,913	50,900	436,400[E]	35,450	101,000	5,800	2,694	2,000
72	Central Illinois Public Serv. Co.	147,769	31,664	93,710	4,493	115,821	5,691	2,556	2,267
73	Commonwealth Gas Co.	146,373	322,921	145,865	5,357	75,612	7,907	1,751	1,234
74	Public Service Co. of NC, Inc.	142,227	43,942	159,226	4,667	108,336	16,180	3,292	N/A
75	Western Kentucky Gas Co.	134,655	39,793	107,003	2,571	76,464	N/A	3,127	N/A
76	Long Beach Gas Dept.	133,000	21,688	55,500	N/A	N/A	N/A	854	1,800
77	The Kansas Power & Light Co.	130,820	47,920	99,165	2,029	50,761	4,789	2,105	2,719
78	Southern Connecticut Gas Co.	130,061	19,432	106,595	6,067	91,772	5,066	1,763	1,984
79	Iowa Electric Light & Power Co.	130,055	38,453	313,619[E]	22,907	58,284	3,786	2,072	1,939
80	NYSEG	127,947	36,534	138,812	5,730	124,834	6,961	2,384	1,416
81	Metropolitan Utilities District Omaha, Nebr.	127,283	31,785	80,323	3,006	98,513	5,017	1,689	1,917
82	Iowa Public Service Co.	121,422	41,463	278,679	31,383	68,925	4,156	1,848	1,644
83	Virginia Electric & Power Co.	120,108	17,495	70,256	N/A	66,289	4,159	2,108	300
84	Providence Gas Co. & Subsidiaries	114,769	19,731	99,069	4,215	81,447	5,274	1,677	1,193
85	Connecticut Natural Gas Corp.[A]	114,608	22,808	84,609	N/A	N/A	N/A	1,535	N/A
86	Connecticut Light & Power Co.[A]	113,875	18,719	73,303	N/A	N/A	N/A	1,723	N/A
87	Gasco Incorporated[A]	111,700	52,100	38,313	N/A	N/A	N/A	N/A	N/A
88	Pennsylvania Gas & Water Co.	111,308	33,240	124,242	17,962	101,928	9,608	1,903	N/A
89	Cons. Gas Supply Corp.	111,298	67,468	1,708,937	28,851	580,659	15,908	8,100	2,613
90	Michigan Gas Utilities Co.	104,857	37,248	122,644	2,870	102,355	6,682	2,523	2,291
91	The Montana Power Co.	103,136	34,159	149,394	43,077	233,296	13,057	1,787	1,933
92	Wisconsin Power & Light Co.	100,141	27,944	103,373	N/A	86,176	7,524	2,104	258
93	North Shore Gas Co.	96,635	34,806	123,949	3,064	103,979	5,254	1,585	1,483
94	City Gas Co. of Florida	93,950	12,406	43,642	2,517	88,942	2,120	1,701	946
95	Intermountain Gas Co.	91,383	33,008	138,833	2,421	115,207	4,641	—	—
96	Orange & Rockland Utilities, Inc.	86,626	24,571	88,389	2,668	64,608	7,509	1,439	1,181
97	Colonial Gas Energy System	85,543	15,544	87,139	2,965	95,698	4,226	1,948	—
98	Gulf States Utilities Co.	85,218	9,097	31,014	672	16,723	1,196	1,280	1,153
99	Cascade Natural Gas Corp.	82,509	39,349	176,170	4,539	138,722	11,094	2,744	1,352
100	North Carolina Natural Gas Corp.	80,449	41,947	137,105	3,939	76,057	4,889	835	1,815
101	Colorado Spgs. Dept. of Publ. Util.	81,609	18,578	57,674	531	35,026	2,460	1,236	448
102	Washington Water Power Co.	75,752	33,637	132,584	29,582	77,975	2,426	2,140	N/A
103	Delmarva Power & Light Co.	73,042	15,693	520,470[E]	48,957	63,720	2,760	95	923
104	Arkansas Western Gas Co.[A]	70,666	17,107	43,063	1,542	51,650	5,258	1,824	290
105	Vangas, Inc.[A]	70,500	—	—	—	—	—	25	—

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
106	Madison Gas & Electric Co.	68,174	20,011	161,755[E]	15,548	58,422	5,490	1,243	916
107	City of Richmond, VA	68,058	12,962	45,966	911	42,515	4,008	960	N/A
108	Trans Louisiana Gas Co.	67,743	2,605	9,495	118	N/A	N/A	N/A	N/A
109	Nashville Gas Co.	67,227	20,082	60,772	519	48,445	1,955	1,394	N/A
110	Michigan Power Co.	65,883	22,896	71,591	967	41,567	3,243	1,498	N/A
111	Rio Grande Valley Gas Co.	64,850	6,534	20,000[B]	N/A	N/A	N/A	1,074	194
112	Southeastern Michigan Gas Co.	64,500	15,427	51,453	2,054	65,305	2,731	1,408	968
113	Northwestern Public Service Co.	62,413	13,740	33,646	13,503	27,566	N/A	1,001[A]	—
114	Associated Natural Gas Co.	62,002	12,496	38,763	2,210	20,810	1,374	1,348[A]	N/A
115	Southern Indiana Gas & Elec. Co.	61,998	19,861	52,190	N/A	31,706	1,552	976	1,172
116	Greeley Gas Co.[A]	61,080	16,867	34,074	—	—	—	—	—
117	Dixie Gas Co.[A]	61,000	500	1,500	—	—	—	12	150
118	United Cities Gas Co.	59,021	162,007	53,533	1,672	49,275	5,121	189	1,527
119	North Central Pub. Serv. Co.	57,963	32,400	144,998[E]	N/A	48,281	4,831	1,056[A]	—
120	City of Corpus Christi-Gas Div.	56,743	5,905	20,550	1,606	13,170	705	974	226
121	West Ohio Gas Co.	54,106	13,190	46,951	1,063	30,794	1,545	1,161	260
122	City Utilities of Springfield, MO	53,243	11,558	59,212	2,220	26,179	1,384	765	767
123	Union Gas System Inc.	52,468	17,133	33,034	1,576	10,794	—	—	—
124	Arkansas Oklahoma Gas Corp.	52,353	12,933	27,723	360	32,278	2,509	167	399
125	Sierra Pacific Power Co.	52,258	7,105	233,943	22,089	29,671	3,276	589	403
126	CP National Corp.	52,032	909	47,170	1,271	41,149	2,075	1,229	1,093
127	Commonwealth Gas Service Inc.[A]	49,525	11,866	38,216	—	—	—	940	—
128	Gas Light Co. of Columbus, GA	49,074	10,044	33,300	509	23,280	891	669	—
129	Lowell Gas Co.	48,915	11,199	54,336	2,514	60,348	3,450	859	N/A
130	Commonwealth Electric Co.	48,217	72,853	37,266	778	18,302	1,562	569	283
131	Missouri Utilities	48,150	8,113	24,359	764	21,602	1,369	826	N/A
132	Pensacola Gas Division[A]	45,908	5,680	14,800	N/A	N/A	N/A	N/A	904
133	Valley Resources, Inc.	45,061	5,822	28,235	1,038	19,896	1,547	478	329
134	Central Hudson Gas & Electric Corp.	44,905	8,752	327,993[E]	23,898	53,551	3,031	689	436
135	Interstate Power Co.	44,316	24,970	62,159	2,677	24,057	2,065	808	N/A
136	Missouri Public Service Co.	40,731	1,102	153,166[E]	12,459	25,009	887	860	486
137	Fall River Gas Co.	40,442	5,911	30,033	989	22,006	2,332	635	N/A
138	Alaska Gas & Service Co.	40,000	30,400	N/A	N/A	N/A	N/A	880	N/A
139	Florida Public Utilities	39,738	6,541	21,966	942	15,859	N/A	556	N/A
140	Cape Cod Gas Co.[A]	38,765	4,488	23,102	N/A	N/A	N/A	1,065	N/A
141	Iowa Southern Utilities	37,864	10,052	102,126[E]	11,477	13,379	583	654	458
142	Wisconsin Fuel & Light Co.	36,920	15,192	49,062	758	12,099	1,595	845	550
143	Wisconsin Southern Gas Co.	36,442	8,314	28,985	863	24,248	1,306	977	606
144	Missouri Power & Light Co.[A]	34,918	7,897	20,443	N/A	N/A	N/A	677	442
145	Terre Haute Gas Corp.	32,380	16,695	43,623	N/A	N/A	N/A	693	330
146	Southeast Alabama Gas District[A]	31,050	10,122	28,409	N/A	N/A	N/A	765	N/A
147	The Hartford Electric Light Co.[A]	30,813	4,627	17,072	N/A	N/A	N/A	394	N/A
148	Battle Creek Gas Co.	30,513	12,296	36,640	1,682	28,043	2,264	506	50
149	Roanoke Gas Co.	30,173	7,313	29,029	1,062	20,883	1,362	611	N/A
150	North Penn Gas Co.[A]	29,931	26,554	78,388	1,375	31,664	1,561	1,869	600

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
151	Haverhill Gas Co.	28,773	4,367	21,851	856	23,214	2,261	560	N/A
152	City of Salem[A]	28,000	880	1,400	N/A	N/A	N/A	50	100
153	Penn Fuel Gas Inc.[A]	27,375	172,319	44,898	N/A	N/A	N/A	N/A	N/A
154	Kokomo Gas & Fuel Co.[A]	27,231	10,578	23,271	N/A	N/A	N/A	118	698
155	Portsmouth Gas Co.[A]	26,342	3,849	13,196	N/A	N/A	N/A	513	505
156	Huntsville Utilities[A]	25,793	5,487	13,533	N/A	N/A	N/A	27	523
157	Ohio Gas Co.	24,422	6,756	23,002	1,178	24,327	2,484	513	400
158	Alexandria Gas Department[A]	24,250	3,078	7,242	N/A	N/A	N/A	57	N/A
159	Chattanooga Gas Co.	28,381	24,081	68,098	679	36,619	1,718	822	N/A
160	Northern Utilities, Inc.[A]	24,071	3,900	14,842	N/A	N/A	N/A	644	N/A
161	Ohio Valley Gas Co.[A]	23,736	7,739	19,609	N/A	N/A	N/A	152	357
162	Berkshire Gas Co.[A]	23,614	4,400	14,637	N/A	N/A	N/A	560	N/A
163	Cheyenne Light, Fuel & Power	23,251	15,984	32,617	619	10,216	716	399	N/A
164	Hoosier Gas Corp.[A]	23,000	5,322	12,237	N/A	N/A	N/A	N/A	N/A
165	Palo Alto Municipal Gas Utility[C]	22,840	3,245	10,565	481	2,241	229	203	215
166	City of Mesa, Arizona	22,448	2,380	8,571	157	9,438	700	511	319
167	City of Hamilton, Ohio	22,056	4,971	13,565	(165)	4,374	(331)	209	648
168	Great Falls Gas Co.	22,043	5.4	18,552	411	9,394	315	267	N/A
169	Willmut Gas & Oil Co.	21,259	3,756	N/A	N/A	N/A	N/A	475	390
170	City of Duluth Department of Water and Gas	21,123	5,229	16,010	161	16,444	2,230	408	N/A
171	Delta Natural Gas Co. Inc.	20,497	3,767	17,593	357	15,735	1,482	493	N/A
172	City of Albany Water, Gas & Light Commission[A]	20,271	4,851	11,000	N/A	N/A	N/A	335	N/A
173	Nebraska Natural Gas Co.[A]	20,238	7,088	14,337	N/A	N/A	N/A	27	N/A
174	Rocky Mountain Natural Gas Co. Inc.	20,161	3,780	15,791	509	21,100	2,278	380	370
175	Gulf Natural Gas Corp.[A]	20,000	N/A	N/A	N/A	N/A	N/A	395	N/A
176	Brazos River Gas Co.	19,886	8,063	8,204	78	4,070	1,506	521	37
177	Austell Natural Gas System[A]	19,180	3,979	11,194	N/A	N/A	N/A	N/A	448
178	River Gas Company[A]	18,390	4,700	13,566	N/A	N/A	N/A	503	139
179	Knoxville Utilities Board	18,284	6,267	23,365	3,480	16,732	3,843	620	340
180	Okaloosa County Gas District[A]	17,500	2,446	8,048	N/A	N/A	N/A	343	461
181	Kansas Public Service Co.	18,075	3,903	9,704	318	5,747	N/A	258	N/A
182	Great River Gas Company	17,796	5,806	19,168	427	9,508	789	479	333
183	Inter-City Gas Corp.[A]	17,517	18,230	N/A	N/A	N/A	N/A	501	265
184	Union Electric Co.	17,290	3,180	11,509	675	13,154	682	259	N/A
185	Gas Service Inc. of New Hampshire[A]	16,726	3,044	10,051	N/A	N/A	N/A	341	N/A
186	South Coast Gas Company[A]	16,500	1,300	N/A	N/A	N/A	N/A	210	N/A
187	Northern Indiana Fuel & Light Co. Inc.[A]	15,914	5,351	11,592	N/A	N/A	N/A	50	386
188	Jackson Utility Division[A]	15,734	5,473	9,095	N/A	N/A	N/A	353	N/A
189	Citizens Utilities Co.	15,430	4,255	10,723	N/A	N/A	3,387	4,255	N/A
190	Manchester Gas Co.	15,277	1,800	2,331	504	15,074	2,482	191	9

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
191	Pennsylvania & Southern Gas Co.	14,851	5,600	19,532	641	14,476	242	454	141
192	Northern Gas Co.[A]	14,487	3,498	10,541	N/A	N/A	N/A	302	42
193	City of Danville Gas Department[C]	14,707	5,425	14,528	1,276	2,708	136	237	217
194	City of Trussville Utilities Board	14,638	1,771	8,341	1,256	16,601	119	300	N/A
195	Rio Grande Natural Gas Assoc.[A]	14,500	2,500	1,200	N/A	N/A	N/A	390	N/A
196	Fitchburg Gas & Electric Light Co.	14,280	2,894	42,310[E]	1,703	12,796	2,211	289	N/A
197	Valley Cities Gas Service[A]	14,083	4,013	11,693	N/A	N/A	N/A	456	N/A
198	Moran Utilities Co.	14,060	4,602	11,994	528	4,998	N/A	287	96
199	Carolina Energies Inc.[F]	14,000	34,452	105,448	6,555	45,365	1,632	414	N/A
200	Volunteer Natural Gas Co.[A]	13,213	8,500	22,000	N/A	N/A	N/A	559	N/A
201	Great Plains Natural Gas Co.	13,115	3,712	13,720	480	6,646	286	65	309
202	Richmond Gas Corp.[A]	13,009	3,631	9,166	N/A	N/A	N/A	209	140
203	City of Las Cruces[A]	12,506	1,778	4,000	N/A	N/A	N/A	50	51
204	Lancaster Municipal Gas Co.	12,398	2,253	1,012	6,829	N/A	N/A	281	N/A
205	City of Houma	12,200	3,846	4,788	433	1,078	100	10.5	173
206	Easley-Ft. Hill Gas Authority[A]	12,143	2,598	7,258	N/A	N/A	N/A	219	N/A
207	City of Warner Robbins[A]	11,789	5,643	6,858	N/A	N/A	N/A	18	190
208	Corning Natural Gas Corp.	11,623	13,171	12,343	318	7,265	239	312	N/A
209	City of Holyoke Gas & Electric Dept.[A]	11,150	1,683	5,496	N/A	N/A	N/A	124	N/A
210	Vermont Gas Systems Inc.[A]	11,139	4,049	13,150	N/A	N/A	N/A	186	N/A
211	Dalton Utilities[A]	10,703	9,617	3,108	N/A	N/A	N/A	264	N/A
212	Hobbs Gas Co.[A]	10,673	1,512	4,074	N/A	N/A	N/A	25	242
213	Charlottesville Gas Division[A]	10,600	2,500	N/A	N/A	N/A	N/A	23	156
214	Pavilion Natural Gas Co.[A]	10,002	2,782	6,686	N/A	N/A	N/A	174	83
215	Middle Tennessee Natural Gas Utility District[A]	9,972	2,880	9,588	N/A	N/A	N/A	599	300
216	Citizens Gas Fuel Co.	9,920	2,909	11,129	806	10,368	781	216	N/A
217	Lake Superior District Power Co.	9,793	10,278	44,658	1,791	6,845	434	228	N/A
218	Union Gas Co.[A]	9,751	5,260	14,261	N/A	N/A	N/A	325	N/A
219	Hastings Utilities	9,628	1,853	4,772	188	4,572	579	140	N/A
220	Southern Public Service Co.[A]	9,590	1,639	3,756	N/A	N/A	N/A	230	N/A
221	Community Public Service Co.[A]	9,362	1,135	2,953	N/A	N/A	N/A	237	N/A
222	Austin Utilities	9,255	8,359	8,379	244	1,502	147	141	N/A
223	City of Florence Gas Dept.	9,164	1,524	4,430	105	5,054	427	410	200
224	Lynchburg Gas Co.	9,158	4,941	16,812	523	11,238	1,652	320	175
225	Midwest Energy Inc.	9,080	2,476	5,107	77	3,564	166	158	N/A
226	City of Pleasant Grove Utilities	9,035	890	4,483	707	500	—	178	85
227	Northern Utilities Co., Allied Div.[A]	9,007	1,960	6,637	N/A	N/A	N/A	249	N/A
228	Superior Water, Light & Power Co.	8,904	257,939	7,890	234	6,419	320	154	134
229	Cedar Falls Utilities	8,840	1,569	4,850	424	3,269	—	127	72
230	Greenwood Comm. of Public Works[A]	8,623	3,111	6,012	N/A	N/A	N/A	83	185
231	Vicksburg Water & Gas Admin.	8,373	1,175	5,248	813	1,800	475	112	—
232	North Carolina Gas Service[A]	8,333	1,750	5,144	N/A	N/A	N/A	295	—
233	Rocky Mount, N.C.	8,195	2,170	8,562	2,069	1,420	142	78	90
234	Midwest Natural Gas Corp.[A]	7,783	1,898	3,478	N/A	N/A	N/A	89	118
235	City of LaGrange Gas Dept.[A]	7,758	2,000	2,500	N/A	N/A	N/A	100	N/A

The P&GJ 500... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant valu. $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
236	Orangeburg Dept. of Public Utilities	7,413	3,408	10,265	729	2,535	55	196	8,549
237	Norwich Dept. of Public Utilities	7,210	997	4,231	(422)	5,197	239	106	—
238	Tallahassee Gas Division[A]	7,190	1,409	3,961	N/A	N/A	N/A	N/A	233
239	Clinton-Newberry Nat'l. Gas Auth.[A]	7,170	N/A	4,035	N/A	N/A	N/A	105	400
240	Owatonna Public Utilities	7,021	3,174	7,410	697	2,258	108	115	N/A
241	City of Graysville, Ala.	7,000	610	2,851	334	3,215	N/A	140	30
242	Schagrin Gas Company[A]	7,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
243	Houston-Magnolia Park Gas System[A]	6,927	N/A	1,408	N/A	N/A	N/A	N/A	55
244	Dyersburg Gas Dept.[A]	6,837	1,632	2,941	N/A	N/A	N/A	N/A	228
245	City of Del Rio Gas System	6,819	480	1,671	23	N/A	N/A	157	N/A
246	Phoenix City Utilities, Gas Dept.[A]	6,651	1,393	1,086	N/A	N/A	N/A	140	N/A
247	Westfield Gas & Electric Light Dept.	6,235	892	4,287	220	1,678	158	121	66
248	Norco Gas & Fuel Co., Inc.	6,222	946	3,679	41	1,790	52	139	31
249	Dixie Gas Co., Inc.	6,219	521	2,073	24	1,825	95	181	29
250	Liberal Gas Company[A]	6,200	1.3	2,000	N/A	N/A	N/A	105	N/A
251	Missouri Edison Co.	6,099	3,551	44,072[E]	1,771	5,985	161	302	144
252	Gibson County Utility District[A]	6,052	1.06	N/A	N/A	N/A	N/A	128	175
253	City of Wilson, N.C.[A]	5,964	864	2,641	N/A	N/A	N/A	N/A	N/A
254	Fultondale Gas Co.[A]	5,957	688	2,352	N/A	N/A	N/A	N/A	143
255	Gas Utilities Co.[A]	5,938	5,249	6,831	N/A	N/A	N/A	146	N/A
256	Allied Gas Co.[A]	5,895	2,261	6,386	N/A	N/A	N/A	N/A	N/A
257	Consumers Gas Utility Co.[A]	5,894	1,126	3,311	N/A	N/A	N/A	127	25
258	Lake Apopka Nat. Gas District[A]	5,862	1,203	2,875	N/A	N/A	N/A	273	N/A
259	Concord Natural Gas Corp.	5,684	1,070	4,752	206	4,871	373	146	78
260	Cullman-Jefferson Counties Gas Dist.[A]	5,573	1,680	4,067	N/A	N/A	N/A	60	350
261	The Polaris Corp.[A]	5,516[A]	518	1,314	N/A	N/A	N/A	106	68
262	Cartersville Gas Dept.[A]	5,506	2,250	1,856	N/A	N/A	N/A	N/A	163
263	Bay City Gas Co., Tex.[A]	5,423	N/A	600	N/A	N/A	N/A	N/A	108
264	Elizabethtown Gas Dept.	5,296	1,368	3,376	3,683	1,000	—	30	126
265	Consumers Gas Co.	5,262	1,396	2.790	N/A	N/A	N/A	88	70
266	Shenandoah Gas Co.[A]	5,224	4,267	10,816	N/A	N/A	N/A	135	76
267	City of Moss Point Utilities	5,200	352	478	N/A	N/A	N/A	N/A	N/A
268	City of Thibodaux Gas Dept.	5,185	667	2,599	45	487	N/A	80	N/A
269	Carnegie Natural Gas Co.	5,152	26,085	64,372	3,035	25,646	5,584	256	N/A
270	The Toledo Edison Co.	5,136	1,417	4,182	282	4,997	338	105	94
271	Natural Gas Distributing Co.[A]	5,058	968	2,000	N/A	N/A	N/A	92	16
272	Watertown Gas Dept.[A]	5,013	1,083	1,996	N/A	N/A	N/A	108	N/A
273	City of Milton Natural Gas System[A]	5,000	450	1,200	N/A	N/A	N/A	43	N/A
274	Sylacauga Utilities Board[A]	4,948	1,390	3,581	N/A	N/A	N/A	472	N/A
275	South Penn Gas Co.[A]	4,929	2,529	6,929	N/A	N/A	N/A	N/A	N/A
276	New Ulm Public Utilities	4,882	1,017	4,630	81	1,736	65	71	N/A
277	Decatur Utilities Gas Dept.	4,842	5,546	16,568	600	6,182	2,014	162	84
278	Northwest Alabama Gas District	4,837	5,027	15,063	1,553	13,977	36	380	270
279	Chanute Municipal Gas Dept.[A]	4,822	1,032	1,974	N/A	N/A	N/A	107	N/A
280	City of Leesburg Natural Gas Dept.[A]	4,812	697	1,317	N/A	N/A	N/A	9	61

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Number of Customers	1980 Gas Sales, MMcf	1980 Oper. Revenues $ (000)	1980 Net Income $ (000)	Gas plant value $ (000) 12-31-80	Additions to plant $ (000)	Miles of Mains	Miles of Services
281	Bristol and Warren Gas Co.[A]	4,794	484	2,005	N/A	N/A	N/A	69	N/A
282	Pike Natural Gas Co.[A]	4,750	1,038	2,967	N/A	N/A	N/A	52	N/A
283	St. Joseph Light & Power Co.[A]	4,667	1,321	3,867	N/A	N/A	N/A	121	52
284	Eastern Illinois Gas & Securities Co.[A]	4,626	1,102	N/A	N/A	N/A	N/A	23	132
285	Oak Ridge Utility District[A]	4,594	822	1,750	N/A	N/A	N/A	128	N/A
286	Thomasville Water & Light Dept.[A]	4,578	801	2,243	N/A	N/A	N/A	141	N/A
287	City of Fairhope Gas Dept.[A]	4,781	482	1,156	N/A	N/A	N/A	85	177
288	Illinois Gas Co.[A]	4,593	813	1,223	N/A	N/A	N/A	10	115
289	City of Lexington Natural Gas Dept.[A]	4,516	1,917	2,857	N/A	N/A	N/A	167	N/A
290	City of Winfield Gas Dept.[A]	4,500	87	1,855	N/A	N/A	N/A	13	N/A
291	Petrolane Wyoming Gas Service[A]	4,454	925	N/A	N/A	N/A	N/A	87	N/A
292	Clarksville Gas Department	4,380	2,826	6,777	283	3,680	63	210	104
293	Town of Westlake[C]	4,376	293	1,234	193	905	42	84	45
294	Indiana Natural Gas Corp.	4,240	909	2,998	175	2,250	114	145	N/A
295	West Tennessee Public Utility District	4,232	1,829	4,935	223	2,890	253	313	85
296	City of Dumas[A]	4,200	N/A	N/A	N/A	N/A	N/A	5	71
297	Cody Gas Co.	4,117	1,571	3,264	24	4,182	645	297	N/A
298	Syracuse Suburban Gas Co. Inc.	4,072	4,308	15,339	106	3,601	278	79	N/A
299	Bluefield Gas Co.	4,100[B]	1,192	4,050	104	2,029	71	98	39
300	Borough of Chambersburg Gas Dept.	4,043	1,003	2,875	249	1,887	94	52	32

The 100 Leading Gas Transmission Lines

Rank	Name of Company	Miles of Pipelines: Total	Trans-mission	Field, Gath.	Storage	1980 Gas Sales, MMcf	1980 Oper. Revenues $(000)	1980 Net Income, $(000)	Gas Plant Value (000) 12-31-8.	Additions to plant 1980 $(000)
1	InterNorth, Inc.	26,663	18,437	8,024	201	755,302	1,739,805	211,721	2,136,191	238,122
2	El Paso Natural Gas Co.	20,837	9,418	11,395	24	1,181,133	2,932,479	(33,896)	2,484,088	106,412
3	Columbia Gas Transmission Corp.	17,987	9,975	6,805	1,208	1,068,265	2,822,340	76,089	1,547,735	138,697
4	Tenneco, Inc.	13,579	13,546	31	2	1,113,322	2,552,637	725,572	2,584,726	121,612
5	Natural Gas Pipeline Co. of America	12,201	10,380	1,726	96	946,109	2,301,033	99,203	1,837,474	106,348
6	Panhandle Eastern Pipe Line Co.	11,857	6,766	4,983	109	664,987	1,515,496	180,237	1,153,115	102,352
7	Kansas-Nebraska Natural Gas Company, Inc.	11,655	9,152	2,482	21	100,761	205,850	21,870	330,157	35,318
8	Enserch Corp.	11,480	8,915	2,489	76	542,950	1,435,278	150,163	763,017	56,985
9	Pioneer Corp.	11,118	9,914	1,204	—	247,358	911,989	90,556	278,901	7,921
10	Michigan Wisconsin Pipe Line Co.	10,968	7,662	3,128	178	674,855	1,951,105	108,672	2,014,986	232,207
11	Transcontinental Gas Pipe Line Corp.	9,687	9,442	124	120	890,583	2,536,088	111,370	2,180,980	144,553
12	Cities Service Gas Co.	9,512	5,832	3,498	182	376,099	731,691	35,608	517,484	37,356
13	Texas-Eastern Transmission Corp.	9,268	9,030	48	190	931,250	2,068,579	243,667	1,879,325	45,933
14	United Gas Pipe Line Co.	9,161	7,308	1,825	28	1,020,879	2,462,826	87,981	852,842	83,229
15	Arkansas Louisiana Gas Co.	9,028	6,121	2,871	35	338,874	801,897	73,426	897,825	83,181
16	Consolidated Gas Supply Corp.	8,171	3,598	4,054	519	627,835	1,708,937	28,851	933,380	48,747
17	Southern Natural Gas Co.	7,296	7,097	150	48	596,886	1,407,447	90,42.	961,237	93,947
18	Colorado Interstate Gas Co.	5,951	2,726	2,992	233	366,438	869,075	51,423	609,177	53,428
19	Texas Gas Transmission Corp.	5,888	5,610	61	217	633,133	1,353,725	78,553	746,821	41,393
20	Northwest Pipeline Corp.	5,352	3,096	2,249	7	332,012	1,294,622	55,452	766,844	80,428
21	ONEOK, Inc.	4,869	3,653	1,195	21	359,796	860,054	40,279	507,252	65,206
22	Trunkline Gas Co.	4,793	3,887	440	465	485,053	1,100,197	61,291	839,054	97,406
23	Pacific Gas & Electric Co.	4,765	3,847	867	51	761,856	2,954,715	135,867	2,219,386	135,832
24	Florida Gas Transmission Co.	4,280	4,280	—	—	193,544	464,842	26,973	412,931	11,320
25	Columbia Gulf Transmission Co.	3,965	3,965	—	—	1,410,448[A]	161,929	33,120	894,837	52,631

Footnotes: A. 1979 Data B. Estimated C. Transports gas for others; no sales.

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Miles of Pipelines: Total	Trans-mission	Field, Gath.	Storage	1980 Gas Sales, MMcf	1980 Revenues $(000)	1980 Net Income, $(000)	Gas Plant Value (000) 12-31-80	Additions to plant 1980 $(000)
26	Transwestern Pipeline Co.	3,679	3,679	—	—	305,325	719,574	23,143	467,170	24,149
27	National Fuel Gas Supply Corp.	3,617	1,504	1,674	440	201,500	542,113	14,232	172,429	15,743
28	The Montana Power Co.	3,168	1,826	1,288	54	49,827	342,459	43,077	233,296	13,057
29	Montana Dakota Utilities Co.	2,991	—	—	—	55,000[B]	181,591	27,077	—	—
30	Peoples Natural Gas Co.	2,329[A]	1,069	1,222	38	—	—	—	—	—
31	Michigan Consolidated Gas Co.	2,312	2,178	28	106	426,851	1,414,787	14,863	1,342,445	74,461
32	Mitchell Energy & Development Corp.	2,160	—	—	—	83,647	696,044	100,835	75,122	27,681
33	Mississippi River Trans. Corp.	2,102	1,969	161	72	199,940	523,327	34,979	270,705	14,045
34	Equitable Gas Co.	2,088	473	1,488	128	93,545	293,705	35,698	370,489	25,661
35	Kentucky West Virginia Gas Co.	1,985	27	1,958	—	26,662	44,998	24,363	137,510	6,492
36	Western Slope Gas Co.	1,976	1,549	400	27	57,657	144,514	2,378	82,267	22,290
37	Transok Pipeline Co.	1,878	756	1,122	—	92,777	126,564	5,082	59,587	10,281
38	Louisiana Intrastate Gas Corp.	1,820	1,820	—	—	208,242	658,441	38,784	211,576	59,874
39	Mountain Fuel Resources, Inc.	1,764	1,424	331	9	122,410	311,718	30,851	495,967	61,516
40	Southwest Gas Corp.	1,571	1,566	5	—	98,455	317,548	8,861	283,505	48,157
41	National Fuel Gas Distribution	1,517	1,183	334	—	201,794	731,190	10,188	407,150	34,169
42	Central Illinois Public Service Co.	1,383	1,356	14	13	31,664	93,710	4,493	115,821	5,691
43	Consumers Power Company	1,244	1,115	22	107	340,762	986,350	65,427	1,195,295	61,429
44	Great Lakes Transmission Co.	1,241	—	—	—	78,497	497,519	16,892	421,524	28,846
45	Carnegie Natural Gas Co.	1,167	256	911	—	26,161	64,372	3,035	25,646	5,584
46	National Gas & Oil Corp.	1,013	—	1,005	8	14,351	40,627	3,236	21,431	2,463
47	East Tennessee Natural Gas Co.	1,012	1,012	—	—	81,609	196,226	7,158	72,156	2,039
48	Carolina Energies, Inc.	1,000	1,000	—	—	34,452	105,448	6,555	44,841	1,090
49	North Penn Gas Co.	918	607	298	13	26,554	78,388	1,375	31,664	1,561
50	Midwestern Gas Transmission Co.	915	903	—	12	194,992	1,053,178	11,733	158,757	15,728
51	Arkansas Western Gas Co.	911	682	225	4	N/A	N/A	N/A	N/A	N/A
52	Algonquin Gas Transmission Co.	908	908	—	—	157,573	504,173	15,602	174,868	1,168
53	Mid Louisiana Gas Co.	776	392	384	—	31,245	83,030	6,719	55,037	10,890
54	South Georgia Natural Gas Co.	767	767	—	—	33,499	95,725	9,081	18,388	519
55	Michigan Gas Storage Co.	717	566	151	—	75,815	155,169	1,742	51,524	773
56	Pacific Gas Transmission Co.	637	637	—	—	308,702	1,405,274	11,767	194,247	4,695
57	Associated Natural Gas	602	602	—	—	12,496	38,763	2,210	33,730	1,061
58	Arkansas Oklahoma Gas Corp.	566	394	169	3	12,933	27,723	360	32,278	2,509
59	Valero Transmission Co.	551	320	231	—	21,207	29,402	882,056	20,220	1,316
60	Inland Gas Co., Inc.	530	95	435	—	9,722	22,622	1,427	23,217	1,300
61	Northern Utilities, Inc.	517	471	46	—	10,647	32,775	210	—	—
62	Ohio Valley Gas Corp.	482	152	330	—	6,458	19,006	506	11,748	925
63	Tejas Gas Corp.	460	—	—	—	85,000	57,300	4,100	27,408	6,000
64	Sea Robin Pipeline Co.	427	427	—	—	273,725	516,051	18,882	226,371	2,402
65	Washington Gas Light Co.	368	368	—	—	103,051	440,115	18,069	558,338	49,953
66	MGTC, Inc.	360	353	7	—	4,428	9,872	763	4,500	300
67	Stingray Pipeline Co.	319	319	—	—	—	46,774	9,227	233,607	267
68	Alabama-Tennessee Natural Gas	314	313	1	—	35,522	91,919	5,265	17,035	572
69	Louisville Gas & Electric Co.	306	178	—	128	58,307	443,893	42,113	132,989	4,973
70	Northern Gas Co.	300	241	47	12	614	17,447	87,447	4,066	848

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Miles of Pipelines: Total	Trans-mission	Field, Gath.	Storage	1980 Gas Sales, MMcf	1980 Revenues $(000)	1980 Net Income, $(000)	Gas Plant Value (000) 12-31-80	Additions to plant 1980 $(000)
71	Ringwood Gathering Co.	272	26	246	—	10,694	14,225	330	9,322	1,562
72	Western Gas Interstate Co.	251	229	22	—	5,330	11,203	287	3,808	571
73	Delta Natural Gas Co., Inc.	247	174	67	6	4,583	17,593	357	10,717	1,199
74	South Jersey Gas Co.	242	239	—	3	41,988	177,605	9,644	138,047	14,768
75	Eastern Shore Natural Gas Co.	238	238	—	—	8,575	30,097	1,601	7,144	50
76	St. Lawrence Gas	234	234	—	—	6,342	31,393	228	10,993	366
77	Valley Gas Transmission Inc.	229	—	229	—	4,330	5,688	94	3,950	66
78	Alaska Pipeline Co.	218	211	7	—	30,460	N/A	N/A	N/A	N/A
79	High Island Offshore System	203	203	—	—	563,589	134,652	11,277	339,510	2,291
80	Consolidated Systems LNG Co.	200	200	—	—	21,659	128,436	13,418	268,623	2,148
81	Standard Pacific Gas Line Inc.	190	185	5	—	—	N/A	N/A	22,639	890
82	McCulloch Interstate Gas Corp.	185	185	—	—	4,448	9,7	602	9,299	38
83	Peoples Natural Gas Co. of S.C.	183	183	—	—	—	9,	321	5,210	681
84	Sabine Pipe Line Co.	174	174	—	—	—	1,8	204	19,115	7
85	Chandeleur Pipe Line Co.	161	161	—	—	—	1,2	(222)	15,984	—
86	San Diego Gas & Electric	128	128	—	—	88,483	299,036	16,563	154,297	18,930
87	West Texas Gathering Co.	127	59	68	—	38,269	35,340	64	4,338	19
88	Gas Transport, Inc.	109	41	68	—	3,799	10,669	868	3,629	164
89	Columbia LNG Co.	88	88	—	—	25,713	124,418	12,164	202,447	3,875
90	Boettcher Oil & Gas. Co.	122	122	—	—	N/A	N/A	N/A	N/A	N/A
91	Lone Star Gathering Co.	84	77	7	—	15,808[A,C]	383	85	2,382	4,829
92	Shenandoah Gas Co.	79	79	—	—	4,152	13,797	171	9,860	1,216
93	Louisiana-Nevada Transit Co.	78	78	—	—	3,992	3,355	181	1,899	119
94	Inter-City Minnesota Pipelines Ltd.	65	65	—	—	12,192	43,063	246	2,679	—
95	Great Plains Natural Gas Co.	65	65	—	—	3,712	13,720	480	10,422	776
96	Granite State Gas Transmission Inc.	57	57	—	—	4,530	12,638	157	2,913	73
97	Tennessee Natural Gas Lines Inc.	56	56	—	—	28,324	63,785	2,472	10,221	107
98	Black Marlin Pipeline Co.	54	54	—	—	2,737	160,823	—	6,753	—
99	Pennsylvania & Southern Gas Co.	50	50	—	—	—	19,533	641	13,422	757
100	Midwest Energy, Inc.	50	50	—	—	2,476	5,107	77	3,564	166

The 100 Leading Liquid Pipelines

Rank	Name of Company	Bbl (000) delivered out of system: Crude oil	Products	Total	1980 Financial (000): Oper Rev.	Net Income	Property Value (000) 12-31-80	Changes in Prop. Val., $(000)	Miles of Lines Owned/Operated: Gath. Lines	Crude Trunk	Products Trunk	Total
1	Arco Pipeline Company	520,105	145,281	665,386	833,733	241,419	2,380,512	87,278	1,810	2,669	3,729	8,208
2	Colonial Pipeline Company	—	632,497	632,497	338,353	73,521	1,261,058	140,633	—	—	5,194	5,194
3	Exxon Pipe Line Company	497,235	65,128	562,363	790,968	263,025	2,167,907	58,917	1,892	4,936	2,235	9,063
4	Shell Pipe Line Company	393,904	125,664	519,569	119,890	23,598	40,392	29,622	2,211	5,239	378	7,828
5	Amoco Pipe Line Company	387,187	128,536	515,724	143,425	45,901	463,005	33,757	2,312	8,315	1,667	12,294
6	Marathon Pipe Line Company	320,567	183,966	504,533	84,485		310,066	23,072	1,026	1,537	1,379	3,942
7	Gulf Refining Company	260,216	233,192	483,416	69,996	20,300	237,592	23,556	1,970	1,161	2,039	5,170
8	Texas Pipe Line Company	314,716	161,368	476,084	74,984	17,833	244,310	6,274	1,248	2,490	539	4,277
9	Lakehead Pipe Line Company	461,018	—	461,018	136,709	26,666	441,766	6,206	—	2,601	—	2,601
10	Mobil Pipe Line Company	256,388	102,140	358,528	118,396	40,694	273,833	6,170	4,368	5,118	2,297	11,783

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Bbl (000) delivered out of system			1980 Financial (000)		Property Value (000) 12-31-80	Changes in Prop. Val., $(000)	Miles of Lines Owned/Operated			
		Crude oil	Products	Total	Oper Rev.	Net Income			Gath. Lines	Crude Trunk	Products Trunk	Total
11	Sohio Pipe Line Company	269,771	42,790	312,561	1,151,533	413,238	3,256,762	43,168	49	262	81	392
12	Buckeye Pipe Line Company	9,246	251,524	260,770	81,438	31,848	319,260	19,943	—	132	3,340	3,472
13	Phillips Pipe Line Company	77,735	151,144	228,880	74,329	10,477	320,235	70,411	1,099	1,947	2,886	5,932
14	Southern Pacific Pipe Lines, Inc.	—	227,338	227,338	57,991	19,014	139,336	13,468	—	—	2,511	2,511
15	Sun Pipe Line Company	122,754	88,202	210,957	50,890	16,305	134,346	7,641	936	1,423	1,881	4,267
16	Continental Pipe Line Company	136,560	51,552	188,112	50,355	16,314	144,357	6,712	4,203	1,491	1,795	7,489
17	Plantation Pipe Line Company	—	182,250	182,250	78,939	11,018	282,555	1,082	—	—	3,154	3,154
18	Williams Pipe Line Company	15,015	161,203	176,218	132,846	26,451	448,073	11,565	—	82	8,191	8,273
19	Chevron Pipe Line Company	123,749	36,097	159,846	42,363	7,383	161,160	14,981	214	1,437	1,490	3,141
20	Texas-New Mexico Pipe Line Co.	152,596	—	152,596	26,822	5,993	86,141	1,421	1,916	2,226	—	4,142
21	Cities Service Pipe Line Company	139,485	4,281	143,766	18,725	2,251	57,252	1,562	626	876	110	1,621
22	Mid-Valley Pipe Line Company	143,376	—	143,376	40,920	5,232	113,130	1,476	—	1,099	—	1,099
23	MAPCO (Mid-America Pipe Line)	—	131,346	131,346	66,792	26,986	361,239	112,696	—	—	7,606	7,606
24	Chicap Pipe Line Company	119,406	—	119,406	12,494	2,427	38,319	538	—	235	—	235
25	Texas Eastern Products Pipeline	—	118,768	118,768	77,855	—	384,695	30,323	—	—	3,333	3,333
26	Ashland Pipe Line Company	106,376	—	106,376	36,807	12,372	90,141	1,682	453	859	—	1,312
27	West Texas Gulf Pipe Line Co.	102,337	—	102,337	16,162	4,043	44,586	35	—	582	—	582
28	Texoma Pipe Line Company	98,290	—	98,290	39,321	7,234	135,752	714	—	504	—	504
29	Four Corners Pipe Line Co.	82,622	13,436	96,058	32,355	9,641	94,393	11,831	295	1,115	24	1,434
30	Texaco-Cities Service Pipe Line Co.	89,798	3,010	92,808	12,804	1,804	51,299	852	—	1,772	106	1,878
31	BP Pipelines, Inc.	87,319	—	87,319	556,820	232,645	1,581,617	82,794	—	818	—	818
32	Wolverine Pipe Line Co.	—	86,292	86,292	23,045	4,150	N/A	N/A	—	—	620	620
33	Explorer Pipe Line Co.	2,261	82,647	84,908	38,504	(1,293)	248,551	1,108	—	—	1,397	1,397
34	Pure Transportation Co.	61,743	19,053	80,796	13,734	2,468	57,011	142	572	433	12	1,017
35	Olympic Pipeline Co.	—	74,074	74,074	18,817	5,180	56,337	355	—	—	391	391
36	Southcap Pipe Line Co.	71,088	—	71,088	16,658	2,460	53,069	(1,960)	N/A	N/A	N/A	N/A
37	Lake Charles Pipe Line Co.	—	70,485	70,485	1,710	41	9,791	1,956	—	—	13	13
38	Owensboro-Ashland Co.	69,169	—	69,169	11,102	3,383	43,338	1,351	—	295	—	295
39	Badger Pipe Line Co.	—	58,660	58,660	7,901	996	22,993	715	—	—	328	382
40	Amdel Pipeline Inc.	52,069	11,501	63,571	6,946	5,603	19,316	—	10	529	28	567
41	Portland Pipe Line Co.	51,614	—	51,614	16,779	3,553	52,752	104	—	513	—	513
42	West Shore Pipe Line Co.	—	50,198	50,198	10,133	1,838	32,215	42	—	—	325	325
43	Hess Pipeline Co.	48,390	—	48,390	10,377	1,338	35,608	1,521	—	334	—	334
44	Seaway Pipeline Co.	48,186	—	48,186	18,155	(12,635)	208,909	7,041	—	515	—	515
45	Osage Pipe Line Co.	46,492	—	46,492	5,451	689	19,585	(10)	—	136	—	136
46	Tecumseh Pipe Line Co.	45,830	—	45,830	2,807	679	15,161	15	—	206	—	206
47	Platte Pipe Line Co.	43,679	—	43,679	15,253	2,496	69,838	110	—	1,280	—	1,280
48	Santa Fe Pipeline Co.	—	40,089	40,089	31,042	5,252	47,489	—	—	—	899	899
49	Oiltanking of Texas Pipeline Co.	37,214	—	37,214	2,791	385	8,579	—	—	15	—	15
50	Shamrock Pipe Line Corp.	24,643	12,031	36,674	14,658	5,054	16,859	1,354	628	316	544	1,588
51	Kaneb Pipe Line Company	—	35,859	35,859	18,637	2,496	44,651	—	—	—	1,303	1,303
52	Dome Pipeline Corporation	—	35,577	35,577	6,386	1,623	21,689	—	1	8	129	138
53	Minnesota Pipe Line Company	34,900	—	34,900	8,382	1,473	28,566	—	—	365	—	365
54	Laurel Pipe Line Company	—	34,673	34,673	12,605	2,612	56,115	504	—	—	452	452
55	Dixie Pipe Line Company	—	33,498	33,498	24,316	2,976	70,341	1,111	—	—	1,304	1,304

The P&GJ 500 ... dimensions of the pipeline energy business

Rank	Name of Company	Bbl (000) delivered out of system			1980 Financial (000)		Property Value (000) 12-31-80	Changes in Prop. Val., $(000)	Miles of Lines Owned/Operated			
		Crude oil	Products	Total	Oper Rev.	Net Income			Gath. Lines	Crude Trunk	Products Trunk	Total
56	Hydrocarbon Transportation, Inc.	—	33,038	33,038	33,689	9,038	124,661	—	—	—	1,514	1,514
57	Collins Pipe Line Company	—	31,832	31,832	3,342	N/A	14,292	—	—	—	124	124
58	Butte Pipe Line Company	31,055	—	31,055	8,729	1,834	17,491	104	—	373	—	373
59	Belle Fourche Pipe Line Company	29,836	—	29,836	12,990	N/A	43,770	2,045	895	728	42	1,666
60	Cook Inlet Pipe Line Company	27,904	—	27,904	10,555	2,810	42,351	21	—	55	—	55
61	Jayhawk Pipeline Corp.	27,885	—	27,885	4,042	274	20,018	178	230	513	—	743
62	Getty Pipeline Inc.	17,042	9,857	26,899	4,542	1,741	14,559	10,820	—	29	345	374
63	Wesco Pipe Line Co.	26,891	—	26,891	10,812	3,296	33,632	7,768	604	527	—	1,131
64	Mobil Alaska Pipeline Co.	26,428	—	26,428	167,224	65,988	390,766	(70,703)	—	818	—	818
65	Coc**'**n Pipeline System	—	26,422	26,422	56,970	41,130	239,415	—	—	—	1,200	1,200
66	Total Pipeline Co.	19,391	7,009	26,400	7,762	2,049	22,185	9,577	—	275	64	339
67	CRA Inc.	24,404	—	24,404	2,549	655	10,418	258	646	242	—	888
68	American Petrofina Pipe Line Co.	23,264	1,078	24,343	340	41	10,866	20	161	538	46	745
69	Ohio River Pipeline Co.	—	23,112	23,112	2,128	380	5,258	484	—	—	364	364
70	Calnev Pipe Line Co.	—	22,736	22,736	10,013	4,595	25,582	2,812	—	—	423	423
71	Yellowstone Pipe Line Co.	—	20,340	20,340	6,787	1,205	27,826	82	—	—	751	751
72	Kenai Pipe Line Co.	19,825	—	19,825	3,827	673	13,097	51	—	24	—	24
73	Chase Transportation Co.	—	18,550	18,550	9,118	7,415	38,719	—	—	—	697	697
74	Wyco Pipe Line Co.	—	18,502	18,502	8,541	1,780	23,197	610	—	—	677	677
75	Diamond Shamrock Corp.	—	17,120	17,120	7,745	1,368	27,002	5,239	—	—	622	622
76	Portal Pipe Line Co.	16,796	—	16,796	9,837	3,763	28,709	—	259	551	—	810
77	Paloma Pipe Line Co.	15,750	—	15,750	2,319	990	5,780	7	N/A	N/A	N/A	N/A
78	Acorn Pipe Line Co.	15,421	—	15,421	4,312	1,700[B]	3,341	13	N/A	N/A	N/A	N/A
79	Kaw Pipe Line Co.	14,390	—	14,390	3,677	671	11,748	84	1,402	—	—	1,402
80	Gulf Central Pipeline Co.	—	14,170	14,170	19,008	5,124	120,687	1,239	—	—	1,901	1,901
81	Kiantone Pipeline Corp.	13,133	—	13,133	2,758	640	12,491	—	—	78	—	78
82	Western Oil Transportation Co., Inc.	13,078	—	13,078	3,578	18,630	14,088	350	—	400	—	400
83	Vickers Pipeline Co., Inc.	12,258	—	12,258	1,101	N/A	4,133	—	—	30	—	30
84	Ohio Pipe Line Co.	7,997	4,199	12,195	4,627	1,747	13,847	—	500	—	384	884
85	Allegheny Pipeline Co.	—	11,340	11,340	5,289	1,624	24,532	334	—	—	602	602
86	Jet Lines, Inc.	—	11,285	11,285	3,914	1,645	11,456	32	—	—	111	111
87	Pioneer Pipe Line Co.	—	10,251	10,251	2,632	539	11,745	52	—	—	303	303
88	Tesoro Pipeline Co.[B]	10,000	—	10,000	3,200	1,000	7,000	—	169	188	—	357
89	Interstate Energy Co.	—	9,661	9,661	9,189	335	54,949	348	—	—	94	94
90	Union Alaska Pipeline Co.	8,831	—	8,831	53,799	20,680	122,715	(23,344)	—	818	—	818
91	Phillips Alaska Pipeline Corp.	8,637	—	8,637	53,897	21,192	123,868	(22,541)	—	818	—	818
92	Trans Ohio Pipeline Co.	—	8,559	8,559	2,099	727	12,884	2	—	—	133	133
93	Trans Mountain Oil Pipe Line Corp.	8,430	—	8,430	340	86	5,742	—	—	64	—	64
94	Amerada Hess Pipeline Corp.	8,318	—	8,318	54,812	17,715	146,552	1,567	—	818	—	818
95	Crown-Rancho Pipe Line Corp.	8,230	—	8,230	1,435	870	2,189	(9)	N/A	461	N/A	461
96	Arapahoe Pipe Line Co.	6,165	—	6,165	1,604	997	10,798	(148)	296	270	—	566
97	Mobil Eugene Island Pipeline Co.	5,632	—	5,632	2,669	1,347	13,115	4,984	N/A	N/A	N/A	N/A
98	POGO Offshore Pipeline Co.	5,462	—	5,462	2,349	N/A	7,946	N/A	N/A	N/A	N/A	N/A
99	Cheyenne Pipe Line Co.	176	5,090	5,266	1,782	799	5,919	(8)	5	34	220	259
100	Powder River Corp.	—	5,262	5,262	2,723	432	9,511	—	—	—	679	679

Footnotes: B. Estimated

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PIPELINE & GAS JOURNAL

SEPTEMBER 1981
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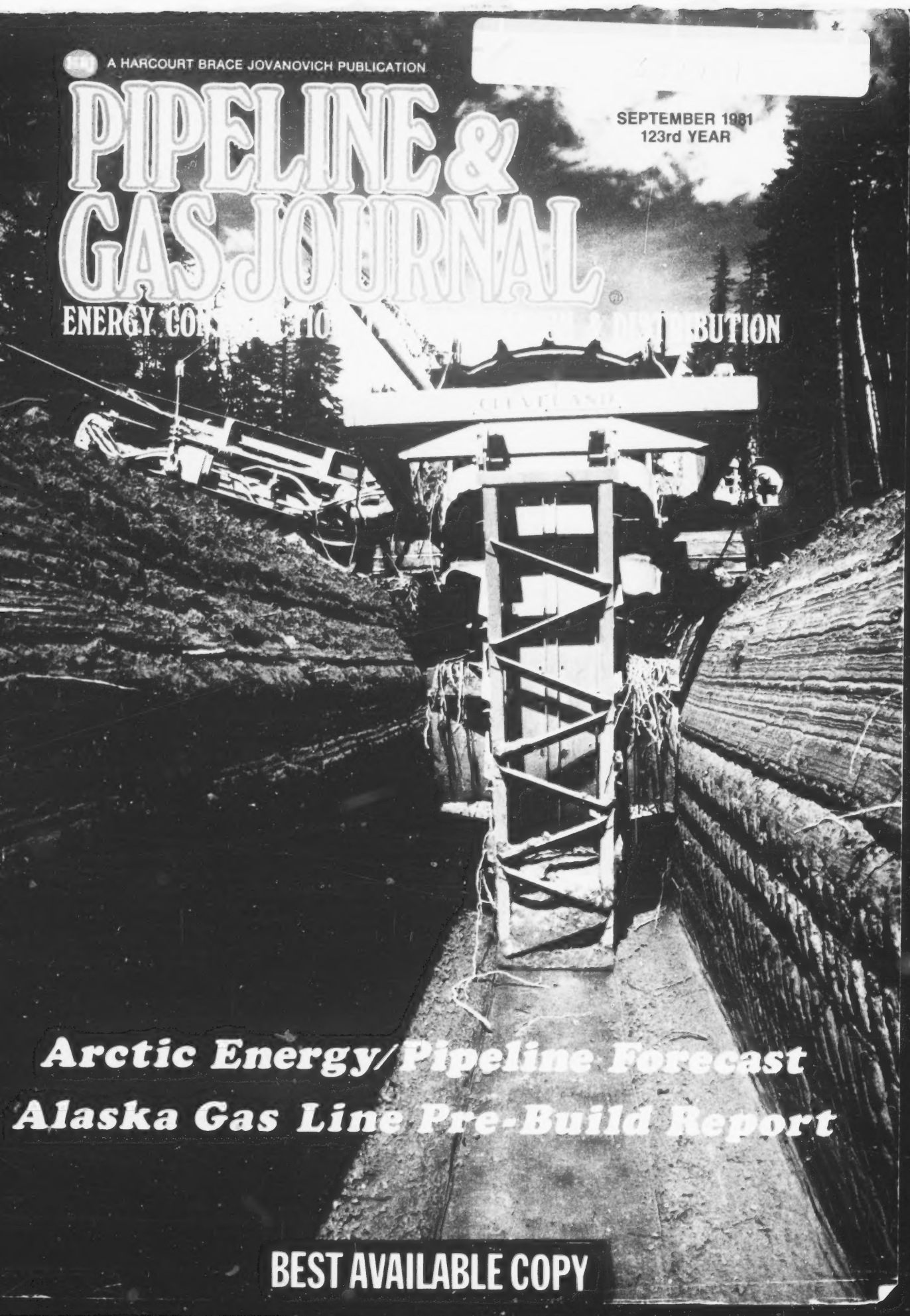

Arctic Energy/Pipeline Forecast

Alaska Gas Line Pre-Build Report

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COVER
Big trencher cuts deep ditch for 42-in. pipe on Section 1 loop of Pacific Gas Transmission system near Sandpoint, Idaho, part of "western leg" of the Alaska Highway Gas Pipeline Project.

–Photo courtesy Cleveland Trencher Co., Div. of Ambaust

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Alyeska Communications System Expanding 84
To meet needs along the oil line and in various communities, 20 earth stations are being added to Alyeska network.

–photo courtesy Hobart Brothers Company

Prebuilding of Western and Eastern Legs of Alaska Highway Gas Pipeline Project will result in completion of more than one-third of total project mileage, permit early movement of gas to market from western Canadian sources on a temporary basis.

Financing Next Step In Building Alaska Gas Line

by Dean Hale, *Editor*

Alaskan natural gas is inching its way closer to the lower 48 states in a slow but methodical fashion. The Western Leg of the line's prebuild delivery system – 132 miles in Canada, 160.5 miles along the Pacific Gas Transmission line, and 351 miles looping Northwest Pipeline's Oregon and Idaho system – has been constructed and is ready for operation in October 1981.

Another big chunk of the overall 4800-mile system–this one involving 823 miles of 42-in. for the Northern Border Pipeline and 395 miles of 42-in. in Alberta and Saskatchewan for Foothills Pipeline Ltd. – is being constructed and will be completed for operation by Nov. 1, 1982.

When both are completed they will accommodate deliveries of more than 1 billion cu ft of gas per day to West Coast and Midwestern markets. Some 240 MMcf/day will go to Southern California and 800 MMcf/day will go to Northern Border participants. That 1.04 Bcf of natural gas is estimated to replace some 200,000 bbl per day of imported oil in the U.S. energy scene.

Building the Western and Eastern Legs prior to the main line from Prudhoe Bay provides many advantages, system sponsors point out, specifically in better utilization of materials, equipment, and labor while enjoying earlier depreciation of facilities that will result in lower rates to consumers. Building now also means avoiding higher costs later due to inflation.

The 1890 miles of pipelines involved is a substantial part of the overall system – over one-third – and evidences that the world's biggest energy transportation project can and will move forward.

Another big step lies just ahead for the Alaska Highway Gas Pipeline Project – arranging the financing so that the Federal Energy Regulatory Commission will issue a certificate of public convenience and necessity–and that in turn will permit actual construction on the Alaska and major cross-Canada sections to begin.

To expedite financing will also require some help from the U.S. Congress, which is being asked to grant certain waivers of previous legislation. Administration officials, Congressional staff, and industry are working hard on getting approval for the waiver proposals so that construction financing can be quickly arranged.

The basic waiver requests include:

- **Billing commencement.** The Alaska gas transportation tariff approved by FERC provides that billing from gas consumers cannot begin until the entire system is completed and commissioned as capable of delivering gas even though gas deliveries may not have begun. Canada's NEB-approved tariff provides billing of full cost of service when the Canadian segment is complete and commissioned. Canadian companies say that the billing commencement okayed by NEB is absolutely essential to finance the Canadian facilities. Waiver would permit such billing by both Canadian facilities and for Alaskan facilities when complete and commissioned. Without such a waiver, financing is not considered possible.
- **Producer equity.** Private financing requires some producer investment in debt and equity in the Alaska facilities. Producers would own equity interest of less than 50% initially and throughout life of project and would not be allowed access to the transportation system nor could they restrict its expansion.
- **Conditioning plant.** Plant should be integral part of the pipeline system but should not be subject to the incentive rate of return mechanism that is now required for most of the pipeline system.
- **Regulatory consistency.** Final, non-appealable orders issued by FERC covering all remaining regulatory actions necessary to begin construction must be effective when

Pipeline & Gas Journal

ARCTIC ENERGY/PIPELINES

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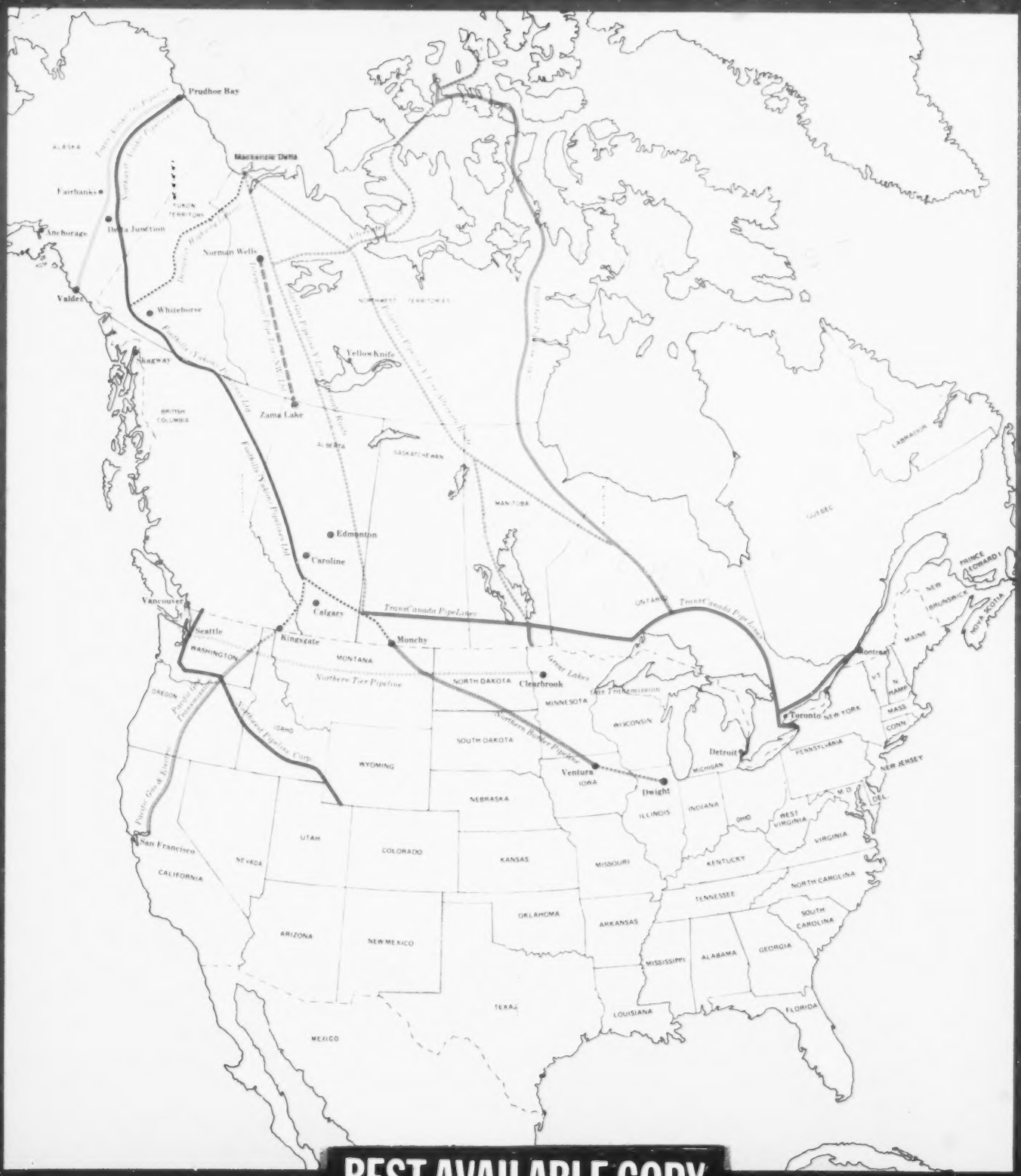

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Moving Arctic Energy To Market

Status of Projects and Proposals – September 1981

Type	Name	Size and Miles	Location	Status
Oil	Trans-Alaska Oil Pipeline	801 miles, 48-in.	Prudhoe Bay to Valdez	Completed and operating.
Oil	Northern Tier Pipeline Co.	1557 miles, 40 and 42-in.	Port Angeles, Wash. to Clearbrook, Minn.	Federal approval and all state approvals but Washington received; financing and permitting underway.
Oil	Interprovincial Pipe Line (NW) Ltd.	540 miles, 12-in.	Norman Wells, N.W.T., to Northern Alberta	Approved by NEB, but delayed until 1985.
Gas	ALASKA HIGHWAY GAS PIPELINE PROJECT			
	Northwest Alaskan Pipeline Co.	745 miles, 48-in.	Prudhoe Bay to Alaska-Canada (Yukon) border	Final application for construction certificate made to FERC; expect approval in 1982.
	Foothills Pipe Lines (South Yukon) Ltd.	232 miles, 48-in. 276 miles, 56-in.	Southern Yukon	Expect Canadian federal approval when Alaskan section is approved.
	Foothills Pipe Lines (North B.C.) Ltd.	444 miles, 56-in.	Nothern British Columbia	Expect Canadian federal approval when Alaskan section is approved.
	Foothills Pipe Lines (Alberta) Ltd.	394 miles, 56-in. 187 miles, 36-in. 234 miles, 42-in.	Alberta	Expect Canadian federal approval when Alaskan section is approved. Prebuild sections. Construction complete on 77 miles of 36-in. Construction underway on 234 miles of 42-in.
	Foothills Pipe Lines (South B.C.) Ltd.	105 miles, 36-in.	Southeastern B.C.	Approval given for prebuild; construction completed on 55 miles of 36-in.
	Foothills Pipe Lines (Saskatchewan) Ltd.	161 miles, 42-in.	Saskatchewan	Approval given for prebuild; construction underway.
	Northern Border Pipeline Co.	823 miles, 42-in.	Monchy, Sask. to Ventura, Iowa	Construction underway; completion by October 1982.
	Pacific Gas Transmission Co.	160.5 miles, 42-in. in four loops.	Idaho, Washington, Oregon	Construction completed; operational in October 1981.
	Pacific Gas Transmission Co. and Pacific Gas & Electric Co.	721 miles, 42-in.		Awaiting FERC approval.
	Northwest Pipeline Co.	100 miles, 30-in. 251 miles, 24-in.	Oregon, Idaho	Loop on existing system; construction completed; operational October 1981.
	Foothills Pipe Lines	740 miles, 34-in.	Near Whitehorse to Mackenzie Delta area	Proposed; estimated cost $2.5 billion (as of June, 1979).
Gas	POLAR GAS PROJECT	3100 miles, 30, 36, and 42-in.	High Arctic Islands and Mackenzie Delta to southern Canada	Project plans to file new application with National Energy Board for new "Y"-line.

accepted with no further action required and must not be altered during life of the project in any manner that would impair service of debt.

● **Regulatory reform to achieve expedition.** Structuring of procedures to assure that all required approvals are final and non-appealable by Feb. 1, 1982.

● **Rolled-in pricing.** Provides assurance that U.S. shippers and lenders who contract for purchase of Alaska gas and ted to roll-in or average Alaska gas costs with other gas acquisition costs.

Speedy Action Required

Inability to resolve problems related to regulatory actions, rates, rolled-in pricing, billing commencement, and other areas has prevented the arrangement of construction financing for the Alaska Highway Gas Pipeline Project, say the sponsors, and they are urging Congress and the Administration to take action.

Time slippage on the project has been significant. As reported in PIPELINE & GAS JOURNAL last September, the overall schedule then proposed was for a certificate to be granted by March 1, 1981, civil work to begin by Jan. 1, 1983, mainline construction work to begin by Feb. 1, 1984, and construction completed by Sept. 1, 1985, with gas deliveries scheduled for the 1985-86 winter season.

It is now one year later and the schedule proposed has, again, slipped one full year.

Even with prompt Congressional action, gas deliveries could not begin before late 1986.

Total cost of the project currently is set at $19.1 billion (in 1980 dollars). That includes $2.6 billion for Lower 48 construction (now almost complete), $5.2 billion for Canadian construction, and $11.3 billion for Alaskan construction.

High side estimates for final costs, taking into consideration inflation for the next five or six years, is that the pipeline will cost $21 billion, the conditioning plant will cost $6 billion, and a $3 billion cost overrun pool should be established – a total of $30 billion. Producers would participate in this for $9 billion (30%).

Even though financing arrangements haven't been completed, a great amount of work is underway on the pipeline, including engineering and design of the line itself and of the gas conditioning plant. (Both are featured in separate articles in this issue.)

Busy Field Program Schedule

Final year of intensive data gathering activities related to design, construction, and operation of the Alaska Highway Gas Pipeline Project has been a busy one, with 18 major field programs underway. Field programs scheduled include fisheries (water bodies crossed or potentially affected by pipeline construction); cultural resources (summer archeological field program); human-carnivore interaction; endangered species and raptors (peregrine falcon field moni-

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toring); revegetation field studies; timber survey (merchantable timber from Yukon River to Alaska-Yukon border);

Site assessment (includes analysis of material sites, spoil disposal sites, solid waste disposal sites, temporary facilities including access roads, miscellaneous sites); trench stability (including blasting techniques in frozen soils as well as ditch wall stability under varying seasonal construction and soil types); field survey along the route at compressor station sites, proposed access roads, temporary facilities, stream crossings, and miscellaneous areas; material sites (to identify material for workpad, ditch backfills, other construction needs); airports and temporary facilities; drilling of boreholes along entire route; fault study – Delta Junction North (extension of fault study made in 1980 from Canadian border to Delta Junction);

Frost heave test sites (seven frost heave test sites constructed for operation through 1981); hydrographic survey (gather hydrologic information for stream crossing designs); water resource survey (to find water sources for seven compressor stations, three new camps, and one Alyeska camp); soil uplift and differential frost heave (test sections constructed in Fairbanks frost heave test area); and long-term surface disturbances (related to thermal analysis of pipeline design).

Route surveying is the biggest program with some 150 people working in the field; firms involved include Fluor, Gulf Interstate/Michael Baker joint venture, and International Technology, Ltd. Second biggest activity is borehole drilling, with 1400 holes to be drilled in 1981 (2600 have been drilled in previous six years) by The Drilling Co. of Anchorage and Reading & Bates/Doyon joint venture. Other firms working on the program include Gulf Interstate/Michael Baker and Arctic Test Lab.

The other major field activity is the frost heave testing program. Contractors on this program include Professional Contractors, Inc., Anchorage; Reading & Bates/Doyon; Modern Construction/Tamak, Fairbanks; C.R. Lewis Co., Anchorage; Earthmovers, Fairbanks; H.C. Price Co., Fairbanks; and Doyon/Ghemm Co., Inc., Fairbanks.

Other Alaskan Gas Developments

Final contract covering engineering services on the 745-mile Alaskan segment was executed early in 1981 by Northwest Alaskan Pipeline Co. and the Southern California Div. of Fluor Engineers and Constructors, Inc. Contract permits Fluor to proceed with $300 million of additional engineering work and other services, including continuing field programs and the start of final design. Fluor has been doing engineering on the line since its selection as managing contractor in 1978.

A giant step forward in getting the gas pipeline built was taken when the Department of Interior granted rights-of-way for the pipeline across more than 400 miles of federal lands in Alaska. The grant requires that the gas line be separated by 200 ft or more from facilities of the trans-Alaska oil pipeline operated by Alyeska Pipeline Service Co., except under specific conditions approved by the Office of Federal Inspector. Several hundred other terms and conditions attached to the right-of-way grant establish environmental, technical, and construction standards for the line.

Northwest Alaskan Pipeline also has been granted air quality permits for seven compressor stations in Alaska. The move permits the pipeline company to obtain manfacturers' bids on gas turbines and compressor units to be installed at each location. The seven stations will be located 80 to 130 miles apart along the pipeline. Two stations will be north of the Brooks Range, three between Brooks and Delta Junction, and two stations between Delta Junction and the U.S.–Canadian border.

The Department of Energy has also recommended to FERC that the remaining Western Leg facilities be built with 42-in. pipe rather than 36-in. pipe. Economic advantages would outweigh the additional $102 million in capital costs for the 328 miles of the PGT segment.

Polar Gas Project

Design work is continuing on the Polar Gas Project, designed to tap natural gas reserves in the High Arctic Islands and, ultimately, deliver 3.3 billion cu ft of gas per day to southern Ontario. As presently visualized, Polar Gas would involve 3100 miles of 30, 36, and 42-in. pipeline and would require 12 construction spreads working for four years to complete. Another year would be required to complete all facilities.

Some 1689 miles of the line would be in permafrost; more than 2000 miles of gravel or insulated workpad would be needed. About 40 miles of line would need special supports. Over 20% of the line will require anchors or set-on weights or concrete weight coating.

Two major marine crossings would be required to get the line to Victoria Island and then on to Melville Island. The southern crossing, 19 miles with maximum depth of 400 ft, would cross Dolphin and Union Strait. The northern crossing, much more difficult, would be 76 miles long with a maximum depth of 1650 ft and would cross McClure Strait. This long crossing would utilize the ice hole bottom pull method, with a configuration of six strings of pipe, each 67,966 ft long. Each string would have 12 sections of 5663 ft each.

Arctic Pilot Project

Hearings are planned for late 1981 on the Arctic Pilot Project (consortium of Petro-Canada, Nova Corp., Dome Petroleum Ltd., and Melville Shipping Ltd.) that proposes to ship LNG from the Arctic to southern Canada on a year-around basis.

Project is designed to deliver 1.765 trillion cu ft of gas over 20 years to markets in the U.S. or Europe, by displacement. That's equivalent to 88.3 billion cu ft per year, or 240 million cu ft per day. Gas would come from Panarctic Oil Ltd.'s field at Drake Point on Melville Island, transported by pipeline, to Bridport Inlet on southern coast of the island. Nova would build the pipeline. Huge ice breaker LNG transports would carry the liquefied gas to an LNG terminal in southern Canada.

Other Developments

On the North Slope, development of Kuparuk Field west of Prudhoe Bay is underway by ARCO, which has drilled some 40 wells on its 12,800 acre tract. The wells, each producing 2000 bbl per day, will be brought on stream in April 1982 to provide 80,000 bbl per day to the trans-Alaska oil pipeline. ARCO is presently building a 26-mile, 16-in. insulated oil line to connect the field to Pump Station 1.

Sohio, which has leases west of ARCO's, (representing about 8 to 10%), plans to develop its area and have wells producing by 1983. The connecting pipeline, with a 200,000 bbl per day capacity, can accommodate the total field production for some time.

Moving Alaska oil to market once it arrives on the West Coast of the U.S. is still the subject of controversy and planning. Northern Tier Pipeline Co., which plans 1550 miles of 40 and 42-in. pipeline from near Seattle to Minnesota, expects to complete financing arrangements by November 1981 and to begin construction in early 1982.

A one-time competitor, Trans Mountain Oil Pipe Line Co. of Vancouver, which had received Canadian NEB approval for a 775-mile, 36-in. line from Washington to near Edmonton to transport Alaskan crude oil, has postponed plans for its line. The $650 million line would have had a capacity of 300,000 to 500,000 bbl per day. Trans Mountain pointed out that refineries in the area it would serve – and further down the transportation system – are operating at 50% of capacity and it could not justify building the line.

P&GJ

Downstream Operations Limit Earnings

by Greg Martin, *Editor, ENERGY NEWS/ENERGY WEEK*

Refining and marketing operations improved over first quarter, but not enough. That was the common theme of integrated companies' earnings reports in second quarter.

Greater income from exploration/production in first half of 1981 was offset by lower margins on downstream business. As a group, the 74 oil companies in our survey showed a 4.7% decline in net income from first half of 1980. Profit margin for the group fell from 6.4% to 5.4%.

Higher prices for U.S. crude oil after decontrol in January, and for natural gas under phased decontrol, lifted earnings of independent producers, though "windfall profits" tax eliminated much of the gain on crude production.

Domestic production made U.S. earnings better than foreign earnings for international operators. Also, strengthening of the U.S. dollar against other currencies resulted in lower margins in foreign countries when expressed in dollars.

Excluding currency translation gains of $588 million (compared to losses of $368 million in second quarter 1980), Exxon's worldwide earnings fell 13.3% from 1980 because of lower margins on refined products and a 15% decline in sales. U.S. refining/marketing in first half 1981, though better than operations abroad, lost $20 million, compared to $147 million profit in same 1980 period.

Shell Oil showed big gain in exploration/production earnings in first half, but downstream earnings fell and overall income remained flat. Standard California's U.S. oil/gas earnings were up 81% but overall net was

FIRST HALF GAS COMPANY FINANCIAL REPORTS

Company	Three months ending June 30** Revenues ($000) 1981	1980	% Chg.	Earnings* ($000) 1981	1980	% Chg.	Six months ending June 30** Revenues ($000) 1981	1980	% Chg.	Earnings* ($000) 1981	1980	% Chg.	Profit Margin 1981	1980
Alabama Tennessee N.G.	27,065	20,124	+ 34.5	1,313	1,311	+ 0.2	106,134[1]	86,877[1]	+ 22.2	5,583[3]	5,154[1]	+ 8.3	5.3	5.9
American Nat. Resources	590,044	459,770	+ 28.3	23,788	16,524	+ 44.0	1,479,146	1,244,981	+ 18.8	85,042	70,684	+ 20.3	5.7	5.7
Arkansas Louisiana Gas	302,421	242,061	+ 24.9	32,602	22,376	+ 45.7	1,088,217[3]	903,349[3]	+ 20.5	82,185[3]	78,320[1]	+ 4.9	7.6	8.7
Coastal Corp.	1,414,706	1,116,527	+ 26.7	(37,494)	28,590		3,186,108	2,562,891	+ 24.3	(24,155)	54,981			2.1
Columbia Gas	862,677	739,542	+ 16.7	31,423	30,629	+ 2.6	2,302,498	2,041,924	+ 12.8	114,817	113,107	+ 1.5	5.0	5.5
Commonwealth Nat. Res.	56,191	40,458	+ 38.9	1,267	1,041	+ 21.7	133,037	110,665	+ 20.2	4,242	4,165	+ 1.9	3.2	3.8
Consolidated N.G.	524,518	464,856	+ 12.8	22,171	11,067	+100.3	1,567,560	1,418,062	+ 10.5	93,389	81,070	+ 15.2	6.0	5.7
El Paso Companies†	1,007,000	898,000	+ 12.1	37,772	6,131	+516.1	2,008,000	1,737,000	+ 15.6	68,676	40,879	+ 68.0	3.4	2.4
ENSERCH Corp.	821,566	617,744	+ 33.0	46,197	31,169	+ 48.2	1,656,408	1,312,431	+ 26.2	102,120	73,801	+ 38.4	6.2	5.6
Houston N.G.[1]	732,963	603,418	+ 21.5	59,478	56,031	+ 6.2	1,452,440	1,190,050	+ 22.0	121,285	105,326	+ 15.2	8.4	8.9
Internorth	737,980	603,871	+ 22.2	39,305	42,722	- 8.0	1,880,595	1,542,267	+ 21.9	155,667	153,187	+ 1.6	8.3	9.9
Mountain Fuel Supply	113,743	95,863	+ 18.7	7,168	7,219	- 0.7	260,300[4]	224,888[4]	+ 15.7	21,743[4]	22,169[4]	- 1.9	8.4	9.9
National Fuel Gas	174,883	135,965	+ 28.6	841	(1,499)		755,137[4]	625,623[4]	+ 20.7	30,495[4]	21,502[4]	+ 41.8	4.0	3.4
Northwest Energy	287,178	283,770	+ 1.2	14,169	10,741	+ 31.9	715,878	715,298	+ 0.1	37,166	28,836	+ 28.9	5.2	4.0
ONEOK Inc.	261,049	205,506	+ 27.0	12,051	9,300	+ 29.6	594,926	485,712	+ 22.5	33,291	30,231	+ 10.1	5.6	6.2
Pacific Lighting	803,948	663,109	+ 21.2	33,596	22,855	+ 47.0	1,593,811	1,435,245	+ 11.0	74,223	45,555	+ 62.9	4.7	3.2
Panhandle Eastern	844,428	550,282	+ 53.5	78,961	37,405	+112.0	1,723,382	1,207,469	+ 42.7	156,759	97,828	+ 60.2	9.1	8.1
Peoples Energy	700,212	671,286	+ 4.3	24,610	25,700	- 4.2	1,934,698	1,747,148	+ 10.7	113,380	91,942	+ 23.3	5.9	5.3
Pioneer Corp.	308,022	234,788	+ 31.2	28,401	22,390	+ 26.8	596,177	445,271	+ 33.9	57,599	45,820	+ 25.7	9.7	10.3
Southern Nat. Res.	623,444	400,516	+ 55.7	37,996	30,748	+ 23.6	1,301,498	954,298	+ 36.4	85,344	67,798	+ 25.9	6.6	7.1
Southern Union Co.	239,173	218,914	+ 9.3	8,568	8,186	+ 4.7	557,465	475,877	+ 17.1	27,832	25,839	+ 7.7	5.0	5.4
Texas Eastern Corp.	1,017,967	1,057,379	- 3.7	59,915	55,569	+ 7.8	2,172,514	2,144,090	+ 1.3	122,523	116,827	+ 4.9	5.6	5.4
Texas Gas Trans.	590,366	511,124	+ 15.5	28,315	18,837	+ 50.3	1,273,530	1,096,457	+ 16.1	59,943	43,910	+ 36.5	4.7	4.0
Texas Oil & Gas[2]	296,062	216,432	+ 36.8	50,570	37,250	+ 35.8	1,149,402[4]	866,497[4]	+ 32.6	138,809[4]	101,292[4]	+ 37.0	12.1	11.7
TransCanada PipeLines							1,797,576	1,516,076	+ 18.6	64,314	47,322	+ 35.9	3.6	3.1
Transco Companies	931,973	601,327	+ 55.0	31,085	27,228	+ 14.2	1,797,163	1,187,562	+ 51.3	62,471	55,586	+ 12.4	3.5	4.7
United Energy Res.	1,277,800	929,401	+ 37.5	53,908	37,096	+ 45.3	2,541,876	1,964,183	+ 29.4	109,312	78,798	+ 38.7	4.3	4.0
TOTAL	15,547,379	12,582,033	+ 23.6	727,976	596,616	+ 22.0	37,625,676	31,242,191	+ 20.4	2,004,055	1,701,929	+ 17.8	5.3	5.4

**Excluding non-recurring items. *Earnings available to common stock. ΔRatio = Earnings ÷ Revenues. [1]Ends April 30. [2]Ends May 31. [3]Twelve months. [4]Nine months. †1980 earnings reflect loss from discontinued LNG operations. ()Loss

held down by lower margins on foreign refining/marketing.

Gulf Oil's worldwide losses from downstream business, excluding Gulf Canada Ltd., totaled $212 million in first half 1981, compared to $476 million profit in same 1980 period.

Despite much higher income from oil/gas and sulfur production, Pennzoil's net income continued to fall from 1980 levels because of lower product margins. Lower margins also caused decline for Marathon Oil.

Coastal Corp. posted net loss in second quarter as worldwide refining/marketing losses of $73.9 million more than offset higher profits on oil/gas production, gas pipelining and coal operations.

Dorchester Gas had big gains in production earnings, but unprofitable refining operations led to an overall decline. Same factor caused decline for Crystal Oil, which also cited higher interest rates – "almost twice what would be expected, given the improvement in inflation measures."

FIRST HALF OIL COMPANY FINANCIAL REPORTS

		Three months ending June 30**						Six months ending June 30**						Profit Margin†	
		Revenues ($000)			Earnings* ($000)			Revenues ($000)			Earnings* ($000)				
		1981	1980	Chg.	1981	1980	Chg.	1981	1980	Chg.	1981	1980	Chg.	1981	1980
1.	Adams R&E	53,435	57,394	- 7.4	(3,231)	(1,945)		119,174	119,705	- 0.4	(5,525)	(3,043)			
2.	Adobe Oil	43,356	40,170	+ 7.9	6,004	5,264	+ 14.1	82,661	79,391	+ 4.1	11,160	10,332	+ 8.0	13.5	13.0
3.	Amcole Energy	899	565	+ 59.1	25	(188)		2,712[4]	1,454[4]	+ 86.6	148[4]	(434)[4]		5.6	
4.	Alaska Interstate	80,330	61,512	+ 30.6	6,284	18,063	-187.4	171,608	118,247	+ 45.1	24,230	28,901	- 16.2	14.1	24.4
5.	American Petrofina	713,724	494,147	+ 44.4	15,251	25,123	- 39.3	1,300,198	1,017,521	+ 35.6	35,501	56,533	- 37.2	2.6	5.6
6.	American Quasar	14,403	11,753	+ 22.5	814	1,395	- 41.6	28,119	21,838	+ 28.8	1,601	3,637	- 56.0	5.7	16.6
7.	Ashland Oil	2,516,913	2,121,931	+ 18.6	3,796	40,768	- 90.7	4,883,005	4,162,090	+ 17.3	4,511	83,030	- 94.6	0.1	2.0
8.	Atlantic Richfield	6,968,034	5,667,450	+ 22.9	380,106	436,416	- 12.9	14,100,354	11,128,626	+ 26.7	726,590	863,433	- 15.8	5.2	7.8
9.	Beard Oil	9,216	4,948	+ 86.3	1,416	1,207	+ 17.3	16,267	10,657	+ 52.6	2,495	2,410	+ 3.5	15.3	22.6
10.	Brock Exploration	1,296	1,174	+ 10.4	(232)	55									
11.	Cities Service	2,208,500	1,814,300	+ 21.7	90,500	107,000	- 15.4	4,484,100	3,986,300	+ 12.5	148,200	277,100	-46.5	3.3	7.0
12.	Clark O&R	432,382	431,167	+ 0.3	13,008	11,246	+ 15.7	863,090	833,441	+ 3.6	8,539	25,346	- 66.3	1.0	3.0
13.	Consolidated O&G	12,813	8,317	+ 54.1	1,711	(384)		24,350	16,458	+ 48.0	3,693	(290)		15.2	
14.	Conoco Inc.	4,916,600	4,657,300	+ 5.6	158,700	249,600	- 36.4	10,312,800	8,987,300	+ 14.7	409,600	578,200	- 29.2	4.0	6.4
15.	Crown Central	380,785	331,891	+ 14.7	3,915	3,404	+ 15.0	758,613	635,445	+ 19.4	(6,313)	14,882			2.3
16.	Crystal Oil	83,635	60,491	+ 38.3	1,598	1,758	- 9.1	159,509	118,812	+ 34.3	25	4,645	- 99.5	--	3.9
17.	Diamond Shamrock	786,281	744,768	+ 5.6	(43,448)	56,346		1,623,830	1,459,521	+ 11.3	4,589	112,601	- 95.9	0.3	7.7
18.	Dorchester Gas[1]	166,418	135,493	+ 22.8	7,583	8,882	- 14.6	318,292	310,271	+ 2.6	14,214	16,465	- 13.7	4.5	5.3
19.	Dyco Petroleum	12,197	7,317	+ 66.7	3,594	1,919	+ 87.3	22,776	13,713	+ 66.1	6,550	3,530	+ 85.6	28.8	25.7
20.	Equity Oil	6,835	3,666	+ 86.4	1,736	948	+ 83.1	12,441	6,970	+ 78.5	2,887	1,789	+ 61.4	23.2	25.7
21.	Exxon	27,469,000	26,223,000	+ 4.8	1,825,000	1,030,000	+ 77.2	57,792,000	53,877,000	+ 7.3	3,425,000	2,955,000	+ 15.9	5.9	5.5
22.	Felmont	17,178	14,940	+ 14.8	3,297	4,201	- 21.5	36,225	26,888	+ 34.7	8,634	7,950	+ 8.6	23.8	29.6
23.	Forest	34,900	21,863	+ 59.6	946	538	+ 75.8	65,994	43,327	+ 52.3	3,228	2,661	+ 21.3	4.9	6.1
24.	Getty Oil	3,216,549	2,643,318	+ 21.7	204,775	242,887	- 15.7	6,511,170	4,912,017	+ 32.6	434,705	468,435	- 7.2	6.7	9.5
25.	Gulf Energy & Develop.	14,112	10,935	+ 29.1	1,726	1,884	- 8.4	28,181	19,801	+ 42.3	3,289	3,397	- 3.2	11.7	17.2
26.	Gulf Oil Corp.	7,200,000	6,794,000	+ 5.9	311,000	470,000	- 33.8	15,074,000	14,547,000	+ 3.6	614,000	859,000	- 28.5	4.1	5.9
27.	Helmerich & Payne	81,326	52,060	+ 56.2	20,297	12,054	+ 68.4	157,316	105,539	+ 49.1	39,001	23,984	+ 62.6	24.8	22.7
28.	Holly Corp.[2]	93,725	112,568	- 16.7	382	3,376	- 88.7	190,129	213,287	- 10.9	1,769	6,274	- 71.8	0.9	2.9
29.	Inexco Oil	61,694	35,977	+ 71.5	8,447	5,602	+ 50.8	114,592	67,697	+ 69.3	14,792	11,349	+ 30.3	12.9	16.8
30.	KRM Petroleum	1,382	1,194	+ 15.7	244	185	+ 31.9	2,734	2,402	+ 13.8	498	575	- 13.4	18.2	23.9
31.	Kerr-McGee Corp.	890,812	854,246	+ 4.3	51,445	49,577	+ 3.8	1,806,938	1,634,640	+ 10.5	94,782	96,719	- 2.0	5.2	5.9
32.	Lear Petroleum	38,903	19,624	+ 98.2	356	1,714	- 79.2	105,072[4]	65,547[4]	+ 60.3	5,745[4]	5,340[4]	+ 7.6	5.5	8.1
33.	Louisiana L&E	298,141	258,436	+ 15.4	41,655	42,832	- 2.7	620,943	523,390	+ 18.6	92,217	94,425	- 2.3	14.9	18.0
34.	Mapco Inc.	505,373	450,799	+ 12.1	29,009	40,165	- 27.8	1,085,394	829,610	+ 30.8	54,444	71,461	- 23.8	5.0	8.6
35.	Marathon Oil	2,133,752	2,039,893	+ 4.6	86,602	108,325	- 20.1	4,557,850	4,305,261	+ 5.9	156,377	247,306	- 36.8	3.4	5.7
36.	Marion Corp.	110,576	137,253	- 19.4	(1,550)	4,956		228,462	237,105	- 3.6	3,668	8,953	- 59.0	1.6	3.8
37.	May Petroleum	10,494	5,757	+ 82.3	1,922	1,224	+ 57.0	19,751	11,083	+ 78.2	4,562	2,577	+ 77.0	23.1	23.3
38.	Maynard Oil	11,015	7,633	+ 44.3	1,613	1,245	+ 29.6	20,997	14,399	+ 45.8	3,929	2,276	+ 72.6	18.7	15.8
39.	McMoRan Oil & Gas	45,498	22,009	+106.7	10,775	6,792	+ 58.6	102,975	40,061	+ 157.0	24,629	12,062	+104.2	23.9	30.1
40.	Mesa Petroleum	100,911	94,949	+ 6.3	26,074	24,652	+ 5.8	204,535	201,880	+ 1.3	55,915	44,565	+ 25.5	27.3	22.1
41.	Mobil Corp.	16,600,000	15,400,000	+ 7.8	700,000	688,000	+ 1.7	33,700,000	30,700,000	+ 9.8	1,340,000	1,534,000	- 12.6	4.0	5.0
42.	Moran Energy	22,749	15,131	+ 50.3	4,541	2,630	+ 72.7	42,713	28,801	+ 48.3	8,908	4,830	+ 84.8	20.9	16.8
43.	Murphy Oil	660,021	454,838	+ 45.1	44,995	35,633	+ 26.3	1,326,827	1,024,083	+ 29.6	83,425	64,023	+ 30.3	6.3	6.3
44.	Natomas	370,276	336,676	+ 10.0	57,557	57,399	+ 0.3	735,706	626,796	+ 17.4	115,794	105,414	+ 9.8	15.7	16.8
45.	Noble Affiliates	93,402	67,265	+ 38.8	18,341	12,090	+ 51.7	180,905	134,849	+ 34.2	36,391	25,549	+ 42.4	20.1	18.9
46.	Nugget Oil Corp.[3]	464,315	388,146	+ 19.6	119,094	126,102	- 5.5	1,554,894[5]	1,265,861[5]	+ 22.8	249,902[5]	523,876[5]	- 52.3	16.1	41.4
47.	Pacific Resources	233,347	179,983	+ 29.6	2,793	4,871	- 42.7	464,729	386,943	+ 20.1	1,413	13,901	- 89.8	0.3	3.6
48.	Patrick Petroleum	31,033	13,347	+132.5	3,344	1,049	+218.8	78,728	42,341	+ 85.9	6,234	1,035	+502.3	7.9	2.4
49.	Peninsula Resources	5,522	3,512	+ 57.2	278	260	+ 6.9	10,671	6,852	+ 55.7	533	405	+ 31.6	5.0	6.0
50.	Pennzoil Co.	672,115	630,996	+ 6.5	57,981	76,542	- 24.2	1,360,103	1,243,901	+ 9.3	117,104	159,043	- 26.4	8.6	12.8
51.	Petroleum Development	3,199	4,876	- 34.4	258	350	- 26.3	6,464	8,364	- 22.7	614	840	- 26.9	9.5	10.0
52.	Phillips Petroleum	4,072,955	3,230,179	+ 26.1	229,767	214,849	+ 6.9	8,301,424	6,614,341	+ 25.5	500,551	499,263	+ 0.3	6.0	7.6
53.	Quaker State	219,919	200,891	+ 9.5	7,367	7,496	- 1.7	438,076	395,751	+ 10.7	11,003	14,375	- 23.5	2.5	3.6
54.	Sabine Corp.	42,992	30,253	+ 42.1	7,422	5,504	+ 34.8	85,435	58,328	+ 46.4	16,035	11,853	+ 35.3	18.8	20.3
55.	Seneca Oil	3,101	895	+247.0	927	16	+5611.0	5,812	2,730	+113.0	1,260	339	+271.0	22.0	12.0
56.	Shell Oil	5,554,000	4,895,000	+ 13.5	410,000	407,000	+ 1.4	10,967,000	9,693,000	+ 13.1	771,000	780,000	- 1.2	7.0	8.0
57.	Southland Royalty	104,647	67,060	+ 35.9	10,423	2,536	+ 75.7	200,327	129,730	+ 35.2	20,410	7,966	+ 61.0	10.2	6.1
58.	Southwestern Energy	11,026	8,931	+ 23.5	2,335	1,819	+ 28.4	32,033	26,929	+ 19.0	7,853	6,164	+ 27.4	24.5	22.9
59.	Standard California	10,979,000	10,649,000	+ 3.1	616,000	535,000	+ 15.1	22,967,000	21,096,000	+ 8.9	1,282,000	1,162,000	+ 10.3	5.6	5.5
60.	Standard Ohio	2,907,900	2,840,600	+ 2.4	478,700	451,300	+ 6.1	6,027,200	5,499,300	+ 10.0	999,100	902,000	+ 10.8	16.6	16.4
61.	Statex Petroleum[3]	2,356	1,596	+ 46.3	333	317	+ 4.9	4,840	2,839	+ 70.5	922	503	+ 83.1	19.0	17.7
62.	Sun Co.	3,900,000	3,000,000	+ 30.0	298,000	247,000	+ 20.7	7,900,000	6,100,000	+ 29.5	418,000	498,000	- 16.1	5.3	8.2
63.	Superior Oil	504,181	350,618	+ 43.8	99,295	68,635	+ 44.7	997,087	680,905	+ 46.4	207,255	137,001	+ 51.3	20.8	20.1
64.	Supron Energy	19,612	16,191	+ 21.1	5,160	4,625	+ 11.6	37,473	31,247	+ 19.9	10,121	9,235	+ 8.5	27.0	29.8
65.	Tenneco	3,776,000	3,201,000	+ 18.0	203,000	186,000	+ 9.1	7,585,000	6,517,000	+ 16.4	397,000	364,000	+ 9.1	5.2	5.6
66.	Texaco	14,799,000	12,537,300	+ 18.0	555,700	502,900	+ 10.5	30,258,400	25,786,200	+ 17.3	1,213,700	1,103,500	+ 10.0	4.0	4.3
67.	Tosco	866,915	598,264	+ 44.9	12,072	23,983	- 49.7	1,629,344	1,132,426	+ 43.9	(26,616)	46,612			4.1
68.	Transcontinental Energy	23,977	18,777	+ 27.7	2,981	174	+1613.2	46,421	36,767	+ 26.3	6,100	168	+3531.0	13.1	0.5
69.	Tribune Oil	657	465	+ 41.3	208	141	+ 47.5	1,220	937	+ 30.2	372	332	+ 12.0	30.5	35.4
70.	Union California	2,685,800	2,648,000	+ 1.4	207,900	194,800	+ 6.7	5,280,100	4,930,300	+ 7.1	362,400	347,700	+ 4.2	6.9	7.1
71.	Universal Resources	15,442	9,626	+ 60.4	3,513	1,638	+114.4	29,587	18,913	+ 56.4	6,321	2,846	+122.1	21.4	15.0
72.	Wilshire Oil of Texas	4,330	3,173	+ 36.5	1,402	672	+108.6	8,119	6,003	+ 35.2	2,205	1,425	+ 54.7	27.2	23.7
73.	Wiser Oil	16,528	14,949	+ 10.5	4,625	3,315	+ 39.5	33,440	30,061	+ 11.2	9,884	8,351	+ 18.3	29.6	27.8
74.	Woods Petroleum	16,055	12,880	+ 24.7	4,074	3,311	+ 23.0	32,432	24,848	+ 30.5	8,741	6,377	+ 37.1	27.0	25.7
TOTAL		131,425,765	116,286,626	+ 11.1	7,443,531	6,887,043	+ 8.1	270,418,667	238,989,039	+ 13.2	14,619,814	15,346,395	- 4.7	5.4	6.4

**Excluding non-recurring items. *Earnings available to common stock. †Earnings* divided by Revenues. [1]Ends May 31. [2]Ends January 31. [3]Ends April 30. [4]Nine months. [5]Twelve months. ()Loss.

Second Quarter Report

Clark Oil, Tosco and Pacific Resources all turned first quarter losses into second quarter profit as crude oil prices dropped about $3/bbl during second quarter and companies were able to recover more raw material and operating costs. Tosco said its ability to refine lower quality, less expensive crude strengthened refining margins.

Net income for Ashland Oil and Quaker State continued to drop from 1980 levels. Ashland said it is reducing higher priced inventories as crude oil prices are moderating.

Wooed and (at this writing) apparently won by DuPont Co. largely because of its coal reserves, Conoco attributed its decline in second quarter income mainly to a strike by United Mine Workers, which resulted in loss of $51.5 million on coal operations, compared to $37 million profit in second quarter 1980.

Exxon paid $1.16 billion of "windfall profits" tax alone in first half 1981. Other WPT totals: Standard Ohio, $813.3 million; Atlantic Richfield, $833 million; Shell Oil, $773 million; Standard California, $678 million; Texaco, $639.2 million; Gulf, $634 million; Mobil, $524 million.

Non-utility operations continued to lead gains in net income for large gas companies. Earnings for the survey group rose respectably in both second quarter and first half 1981.

Higher profits from oil/gas production led to first half improvement for Consolidated Natural Gas. Gas sales to industry have improved.

Exploration/production was largest income producer for ENSERCH in second quarter and oilfield services again showed biggest gain. Gas sales and income for Lone Star utility division rose because of greater sales to electric utilities and industry.

United Energy Resources' higher income levels reflected more gas sales at higher prices and stronger contract drilling operations.

Contract drilling has shown greatest percentage increase in profitability among ONEOK's subsidiaries.

Non-utility segments were source of earnings gains for Southern Union, more than offsetting lower earnings from gas utility operations.

All-time high results for Texas Oil & Gas were due to higher gas gathering volumes, higher levels of production and prices for company-owned gas, and good contract drilling results.

All operations for Texas Gas Transmission – pipelining, oil/gas production, trucking, inland waterways – were higher than in same 1980 period.

Higher utility earnings were chief factor in Pacific Lighting's first half improvement.

First half earnings for InterNorth were flat and second quarter earnings fell from same 1980 quarter. Business recession hurt gas sales, petrochemical and liquid fuels operations.

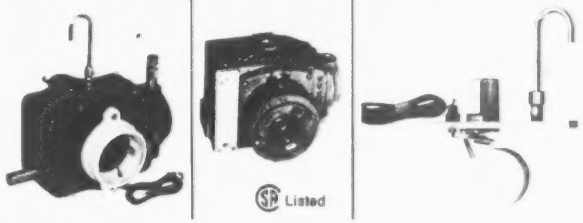
Lower than normal industrial activity also caused lower gas sales for Alabama-Tennessee.

Mountain Fuel Supply's first half earnings dropped from 1980 mainly because of less profitable utility operations. Oil exploration/production showed substantial gains.

CONTROL TIPS

AUTOMATICALLY MAINTAIN SAFE CRANKCASE LEVELS.

LR-900 | LR-900EX | LR-557



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L-1200/L-1200N FLOAT SWITCH

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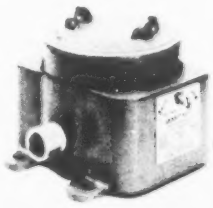

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The magnetic latching feature assures virtually no wear on the internal tripping mechanism. Whenever acceleration of the equipment exceeds the holding force of the magnet, the latching member is released and D.P.D.T. contacts, rated 5 amps at 480 V AC, are transferred. Pneumatic Model (VS-2-N) vents 20-80 psi supply for equipment shutdown.
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COVER

Construction on the 48-in. gas pipeline on mainland Italy, for Trans-Mediterranean Gas Pipeline Co., is well underway with over 215 km complete and construction spreads moving north over rugged terrain to complete the big line in time for 1983 operation.

- photo courtesy Saipem S.p.A.

Worldwide Construction Reaches 113,000 Miles, $138 Billion 29

Superprojects abound as planning for movement of energy supplies around the globe intensifies; latest P&GJ survey indicates over 78,000 miles planned or underway in Free world. Total cost of all planned and underway lines estimated at $138 billion.

Danish Gas System Construction Progressing On Schedule 38

First cross-country gas transmission line for the Danish Oil and Natural Gas system is nearing completion between Froslev and Egtved.

Trans-Mediterranean Gas Line Advancing On Rome 46

Huge 1550-mile inter-continental gas pipeline system linking Algerian fields to Italian industrial centers nearing completion; lines in Algeria and Tunisia to complete in November, Sicilian section complete, work underway on mainland.

Twin Australian Lines Have Many Problems 55

Dual products and natural gas lines being installed between Sydney and Newcastle have suffered delays because of labor problems, terrain, and mechanical problems; lines are scheduled to be completed by end of 1981.

Mobile Repair Train Developed 58

O&K of Germany has developed a traveling "repair train" of specialized vehicles to provide service to heavy equipment on projects in remote areas.

Pipeline Anchoring Saves Money 62

Major gas pipeline project finds auger anchors give big costs savings over set-on concrete weights; new tools insure anchors provide proper "hold down."

Construction Claims 71

Part 1 of new series provides introduction to management of construction claims – essential to maintaining the financial health of contractors and capital projects alike; discussed are key project tools and the project "post mortem" approach.

Testing and Calibrating Turbine Meters .. 78

Part 3 discusses field tests and how they are used to prove turbine meters; discussed are equipment used for field proving and suggested methods.

What's New In Valves and Valve Actuators 85

Showcase of the latest innovations in all types of valves and valve actuators used in oil and gas pipeline and gas distribution utility applications.

Construction Equipment Specifications .. 102

International Pipeline Forecast

Nine sidebooms, three backhoes, and a dragline play their respective roles as pipe is prepared for cradling into river bed during river crossing installation operation on British Gas' 42-in. Fourth Feeder line in Scotland by Nacap crews.

Worldwide Projects Now Total Over 113,000 Miles, $138 Billion

by Dean Hale, *Editor*

International pipeline construction activity in 1982 will bring a new peak in expenditures, with an estimated $8.924 billion to be spent in 1982 for the construction of nearly 13,100 miles of natural gas, crude oil, petroleum products, gas liquids, and slurry pipelines in all global areas outside the United States. PIPELINE & GAS JOURNAL's survey of world pipeline activity reveals a total figure of 113,364 miles of lines planned or underway – at a cost of $138 billion – around the globe. That includes 35,720 miles in the U.S.S.R., the Eastern Bloc countries, and the Peoples Republic of China. Excluded is pipeline activity in Iran and Afghanistan.

For 1981, the PIPELINE & GAS JOURNAL worldwide survey indicates that 5127 miles of gas transmission, field, and gathering lines will be completed; 4660 miles of crude oil trunk lines and gathering lines; 2635 miles of petroleum products and natural gas liquids and LPG lines, and 1128 miles of offshore oil and gas pipelines and gathering lines.

That 13,550 mile total for 1981 construction reflects a commendable record of project completions around the world on both major and minor pipeline undertakings. That includes completion of the Algerian, Tunisian, and Sicilian sections of the Trans-Mediterranean Gas Pipeline; British Gas Corp.'s 42-in. fourth feeder line from St. Fergus; the initial pipeline work on the Danish Oil and Natural Gas system in Denmark; a considerable amount of oil and gas pipelines in Saudi Arabia and Abu Dhabi; the Gulf of Thailand 266-mile, 34-in. offshore gas line and the 105-mile, 28-in. land line.

Even with the completion of many major projects in the past few years, an exciting future lies ahead for the international pipeline business. Of the total projects listed in the P&GJ survey, 62.3% of the mileage is for natural gas lines, 21.4% is for crude oil pipelines, 13.6% is for products lines, and 2.7% is for slurry pipelines. Of pipelines currently under construction, 67% are natural gas, 26% are oil, and 7% are petroleum products lines.

INTERNATIONAL PIPELINE CONSTRUCTION
(As of September 1981)

	Miles		
Type of Line	Total	Underway	Planned
Natural gas	70,517	8,359	62,158
Crude oil	24,303	3,418	20,885
Petroleum Products	15,415	916	14,499
Slurry	3,129	—	3,129
TOTALS	113,364	12,693	100,671

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INTERNATIONAL PIPELINE CONSTRUCTION – BY COUNTRIES

(Underway, Planned, and Proposed – September 1981)

Country	Total Miles, Gas Pipelines		Total Miles, Crude Oil Pipelines		Total Miles, Products Pipelines		Total Miles, Slurry Pipelines		Total Miles, All Pipelines	
	Total	Underway	Total	Underway	Total	Underway	Total	Underway	Total	Underway
Abu Dhabi	250	125	—	—	—	—	—	—	250	125
Algeria	2903	553	393	393	386	62	—	—	3692	1008
Argentina	3893	1258	300	—	12	—	88	—	4293	1258
Australia	2681	—	477	403	359	123	189	—	3706	526
Austria	—	—	—	—	—	—	—	—	—	—
Bangladesh	260	—	—	—	—	—	—	—	260	—
Belgium	226	—	—	—	—	—	—	—	226	—
Bolivia	1607	166	—	—	536	—	—	—	2143	166
Brazil	1207	264	907	264	360	—	9	—	2483	528
Bulgaria	—	—	—	—	—	—	—	—	—	—
Cameroons	125	—	2	—	—	—	—	—	127	—
Canada	10,408	844	1838	186	531	186	500	—	13277	1216
Chad	—	—	—	—	—	—	—	—	—	—
Chile	605	—	10	—	—	—	46	—	661	—
China	2000	—	1500	—	—	—	—	—	3500	—
Columbia	601	—	974	20	345	40	—	—	1920	60
Congo	—	—	14	—	—	—	—	—	14	—
Costa Rica	—	—	—	—	35	—	—	—	35	—
Czechoslovakia	535	535	—	—	—	—	—	—	535	535
Denmark	8060	59	—	—	—	—	—	—	8060	59
Dubai	—	—	17	—	—	—	—	—	17	—
Ecuador	478	162	6	—	55	—	—	—	539	162
Egypt	320	168	735	660	—	—	—	—	1055	828
France	2849	1519	350	—	169	—	—	—	3368	1519
Greece	70	—	50	—	—	—	—	—	120	—
Guatemala	—	—	237	—	—	—	—	—	237	—
Honduras	—	—	160	—	—	—	—	—	160	—
Hungary	—	—	188	—	112	—	—	—	300	—
India	534	—	18	—	660	330	620	—	1832	330
Indonesia	—	—	105	—	2	2	—	—	107	2
Iran*										
Iraq	350	350	1322	—	1011	—	—	—	2683	350
Ireland	159	—	—	—	—	—	—	—	159	690
Italy	869	598	86	86	6	6	—	—	961	—
Ivory Coast	—	—	—	—	—	—	—	—	—	—
Japan	1080	—	—	—	—	—	—	—	1080	—
Kenya	—	—	—	—	248	—	—	—	248	—
Korea	—	—	450	—	—	—	—	—	450	—
Kuwait	44	—	435	400	23	—	—	—	502	400
Libya	431	373	601	120	—	—	—	—	1032	493
Malaysia	80	—	—	—	—	—	—	—	80	—
Mexico	1057	60	228	—	1363	—	—	—	2648	60
Netherlands	130	—	123	—	100	—	—	—	353	—
New Zealand	685	—	—	—	105	105	—	—	790	105
Nigeria	3110	—	344	80	—	—	—	—	3454	80
Norway	—	—	—	—	—	—	—	—	—	—
North Sea	1184	—	158	—	—	—	—	—	1342	—
North Yemen	—	—	—	—	227	—	—	—	227	—
Oman	140	—	461	251	—	—	—	—	601	251
Pakistan	515	32	1065	525	—	—	—	—	1580	557
Panama	—	—	75	—	—	—	—	—	75	—
Peru	—	—	644	—	—	—	—	—	644	—
Poland	—	—	—	—	—	—	342	—	342	—
Portugal	—	—	—	—	69	—	—	—	69	—
Saudi Arabia	250	—	448	—	1506	—	—	—	2204	—
South Africa	225	—	—	—	—	—	—	—	225	—
Spain	305	—	30	—	68	—	—	—	403	—
Sudan	—	—	894	—	—	—	—	—	894	—
Syria	—	—	30	30	—	—	—	—	30	30
Sweden	185	—	—	—	—	—	—	—	185	—
Switzerland	71	71	—	—	—	—	—	—	71	71
Tanzania	—	—	—	—	678	—	—	—	678	—
Thailand	278	—	267	—	458	—	—	—	1003	—
Tunisia	508	179	—	—	—	—	—	—	508	179
Turkey	50	—	780	—	250	—	—	—	1080	—
Taiwan	44	—	135	—	166	—	—	—	345	—
United Kingdom	965	110	—	—	283	103	—	—	1248	213
USSR	18,022	1422	7180	—	4506	—	1335	—	31403	1422
Venezuela	27	—	185	—	—	—	—	—	212	—
W. Germany	221	—	81	—	201	—	—	—	503	—
Yugoslavia	—	—	—	—	—	—	—	—	—	—
Zaire	—	—	—	—	205	—	—	—	205	—
Zambia	—	—	—	—	380	—	—	—	380	—

*Iran data not included

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INTERNATIONAL PIPELINE CONSTRUCTION – BY AREAS

(Underway, Planned, and Proposed – September 1981

Area	Total Miles, Gas Pipelines		Total Miles, Crude Oil Pipelines		Total Miles, Products Pipelines		Total Miles, Slurry Pipelines		Total Miles, All Pipelines	
	Total	Underway	Total	Underway	Total	Underway	Total	Underway	Total	Underway
Europe	15294	2357	878	86	896	109	—	—	17068	2552
Africa	7622	1273	2983	1253	1897	62	—	—	12502	2588
Middle East	1034	475	3493	681	2767	—	—	—	7294	1156
Asia, Japan, Pacific	2761	32	2040	525	1536	332	620	—	6957	889
Australia & New Zealand	3366	—	477	403	464	228	189	—	4496	631
Canada	10408	844	1838	186	531	186	500	—	13277	1216
Mexico & Central America	1057	60	700	—	1398	—	—	—	3155	60
South America	8418	1850	3036	284	1308	95	143	—	12895	2229
Subtotal	**49960**	**6891**	**15435**	**3418**	**10797**	**1012**	**1452**	**—**	**77644**	**11321**
U.S.S.R.	18022	422	7180	—	4508	—	1335	—	31043	1422
Eastern Bloc	535	535	188	—	112	—	342	—	1177	535
China	2000	—	1500	—	—	—	—	—	3500	—
Subtotal	**20557**	**1957**	**8868**	**—**	**4618**	**—**	**1677**	**—**	**35720**	**957**
GRAND TOTAL	**70517**	**8848**	**24303**	**3418**	**15415**	**1012**	**3129**	**—**	**113364**	**13278**

In the Free World, Europe leads the list with a total mileage of 17,068 and with 2552 miles under construction. Canada is in number two spot, with 13,277 miles total and 1216 miles underway. South America again ranks third with a total of 12,895 miles total and 2229 miles actually under construction, followed closely by Africa, with 12,502 miles total and 2588 miles underway. Pipeline activity in the Middle East has diminished from recent highs, and now totals 7294 miles, with 1156 miles under construction. The Asia-Japan-Pacific area totals 6957 miles, with 889 miles underway, followed by Australia and New Zealand, with 4496 miles total and 631 miles underway, and Mexico and Central America, with 3155 miles total and 60 miles under construction.

Russia, which recently announced its latest five-year plan, has a total of 31,043 miles on the books and 1422 miles underway; mainland China's pipeline activity, 3500 miles planned, remains a mystery.

Super projects remain a major attraction in the world's future pipeline plans. Included in this category are the 960-mile Dampier-to-Perth gas pipeline in Western Australia; Norway's Statline 518-mile North Sea pipeline system; Nigeria's proposed 1560-mile gas line to the Mediterranean via Algeria, and Canada's proposed 3000-mile Polar Gas project.

Europe

Natural gas now supplies some 15% of the primary energy in Western Europe and, according to Dr. Burckhard Bergman of Ruhrgas in West Germany, 85% of the gas comes from domestic production. Dr. Bergman expects gas to keep and enlarge its share of the European energy market provided that prices remain competitive with other energy forms. That can only mean the need for gas pipelines will increase.

Major exporters of gas to Western Europe are U.S.S.R. and Algeria. Soviets are the leader at present, and Algeria will have a strong second position when gas begins flowing through the Trans-Mediterranean Gas Pipe Line. Western Europe now receives 52% of all gas exported in the world and is expected to take even more in the future.

Pipeline construction, presently at a moderate rate in Europe because of the high cost of money to finance projects, is experiencing slippage on many projects, both big and small. No downturn of activity is contemplated, but no major upswing is seen, either, P&GJ's survey indicates.

In the U. K., British Gas Corp. has completed its 280-mile, 42-in. fourth feeder line running southward from St. Fergus and current activity is confined to relatively short extensions and reinforcement lines.

The British North Sea Gas Gathering Network may not be built. The British government won't give support to the $4.9 billion project, involving 440 miles of 20 to 36-in. undersea lines to collect gas from 20 U. K. fields. Government said financial support was needed from the private sector and hasn't been given. A major reason, say oil company spokesmen, is the unwillingness of British Gas to commit itself to an across-the-board price for natural gas from the North Sea.

North Sea work abounds, however. The 57-mile Magnus field gas line and the 45-mile West Sole Field to Easington Gas Terminal line have both been installed. Work is underway on seven 6-in. flow lines at Magnus.

In Italy, work is progressing on the 649-mile mainland 48 and 42-in. gas pipeline to deliver Algerian gas to the industrial regions of both southern and northern Italy, as well as Rome. In the Mezzogiorno (Southland) region, a new gas utility will build pipelines to supply 364 communities at a cost of $180 million (see special report this issue).

Norway's gas pipeline system including 518 miles of 26, 30, and 36-in. is expected to get under construction in 18 months; the system must be completed by 1986. Main line from Statfjord to the Karstoe terminal will cross the deep (1075 to 1300 ft) Norwegian Trench. The line out from Karstoe to Ekofisk will cross it again.

Most activity in the Netherlands is offshore, with 135 miles of gas line and 50 miles of oil line planned. Another 125 miles of dual-phase oil/gas line is also planned by NAM/Union Oil/Petroland.

Denmark's planned national gas network is getting underway. First construction of 60 miles of 24-in. from Froslev to Estvig is nearing completion (see article this issue) and pipe for the 136-mile, 30-in. offshore line to connect Tyra Field to Esbjerg on the coast is now being coated. Another 40 miles of offshore 10 to 14-in. gathering lines are planned. The 1200 miles of transmission lines and 7500 miles of distribution laterals are being engineered for construction in 1983 and later.

West Germany's planned projects include a 90-mile oil line

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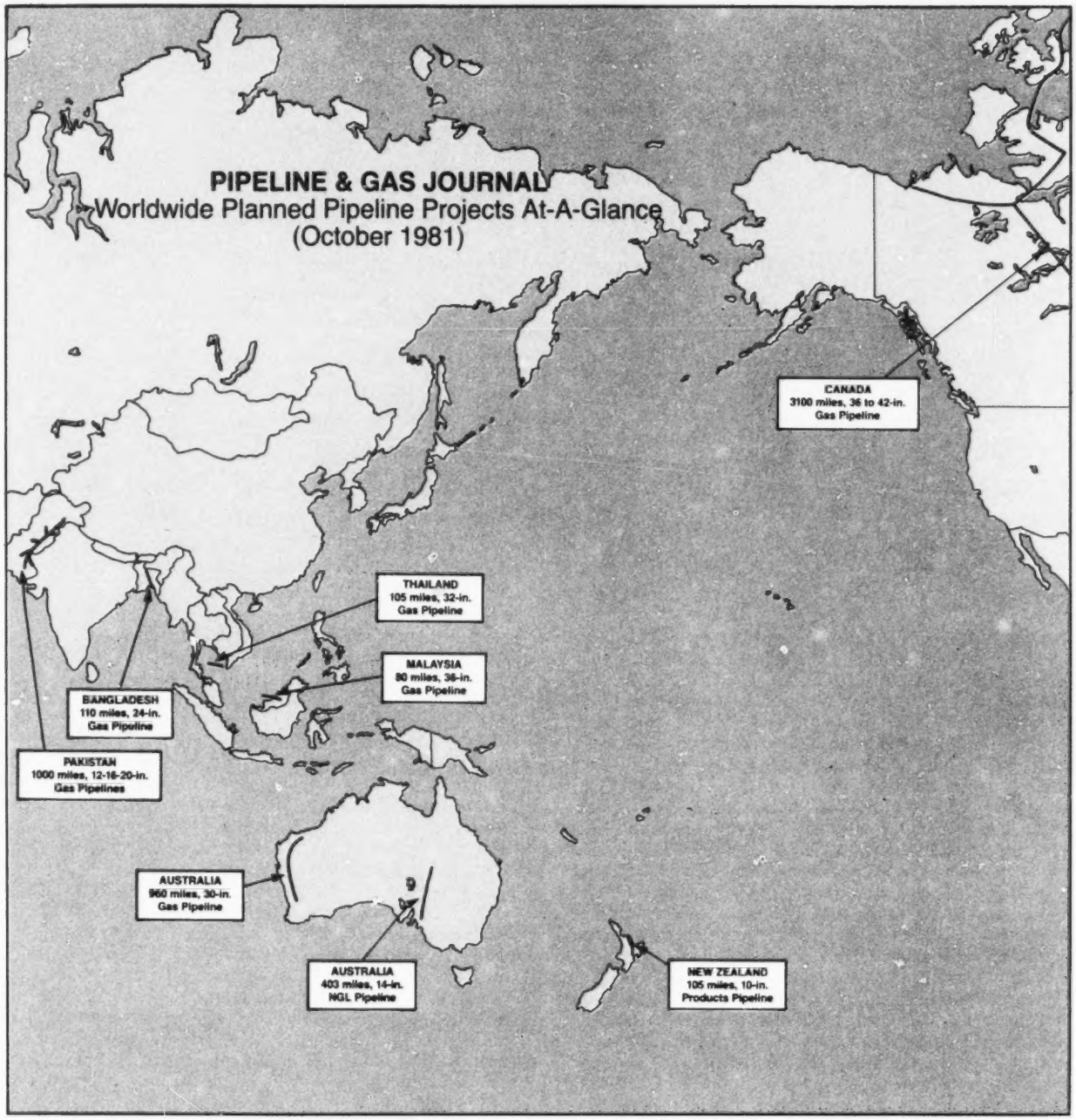

from Wilhelmshaven to Hamburg and 186-mile, 16-in. products line from Wilhelmshaven to the Ruhr Valley. Spain's Enagas is expanding its system with a 26-in. line from Burgos to Madrid, plus laterals to Guadalajara and Toledo and a line from Burgos to south of Vitoria. Enagas plans some 1500 miles of new lines by 1985.

Gaz de France is installing some 345 miles of gas transmission lines in 1981 and will install 406 miles in 1982. Sweden plans 188 miles of 24 and 36-in. gas line from Malmo to Halstead. A 70-mile offshore gas line from Otranto, Italy to Gréece's Isle of Corfu is being studied by Snamprogetti.

Middle East and Africa

Two major pipeline proposals are in the news in this area of the world – one is the revived SEGAMO project involving some 200 miles of large diameter pipe between Algeria and Spain to carry gas – Bechtel reportedly has contract to study present-day feasibility; the other is a 1560-mile, 30 or 36-in. gas pipeline from Nigeria to Algeria's Mediterranean coast, with the gas to be exported to Western Europe. Nigeria reportedly is abandoning its Bonny LNG plant plans because of continuing cost escalation for the facility.

In Tunisia, state-owned gas and electric agency STEG plans 180 miles of 10 and 20-in. laterals and 250 miles of 8-in. gas distribution lines.

Algerian pipeline construction activity has softened with the deferral of numerous projects "to a later time." Algeria's Sonatrach and its LNG customers are having difficulty agreeing on new prices and LNG deliveries (and consequently revenues) have slowed or terminated. Similarly, Algeria has had difficulty selling its oil at premium prices. The 393-mile, 30-in. oil line from In Amenas to Haoud El Hamra in southern Algeria is being completed, as are other major projects that have been underway for some time. That includes the Trans-Mediterranean Gas Pipe Line from Hassi R'Mel to the Algerian-Tunisia border and the Tunisian sec-

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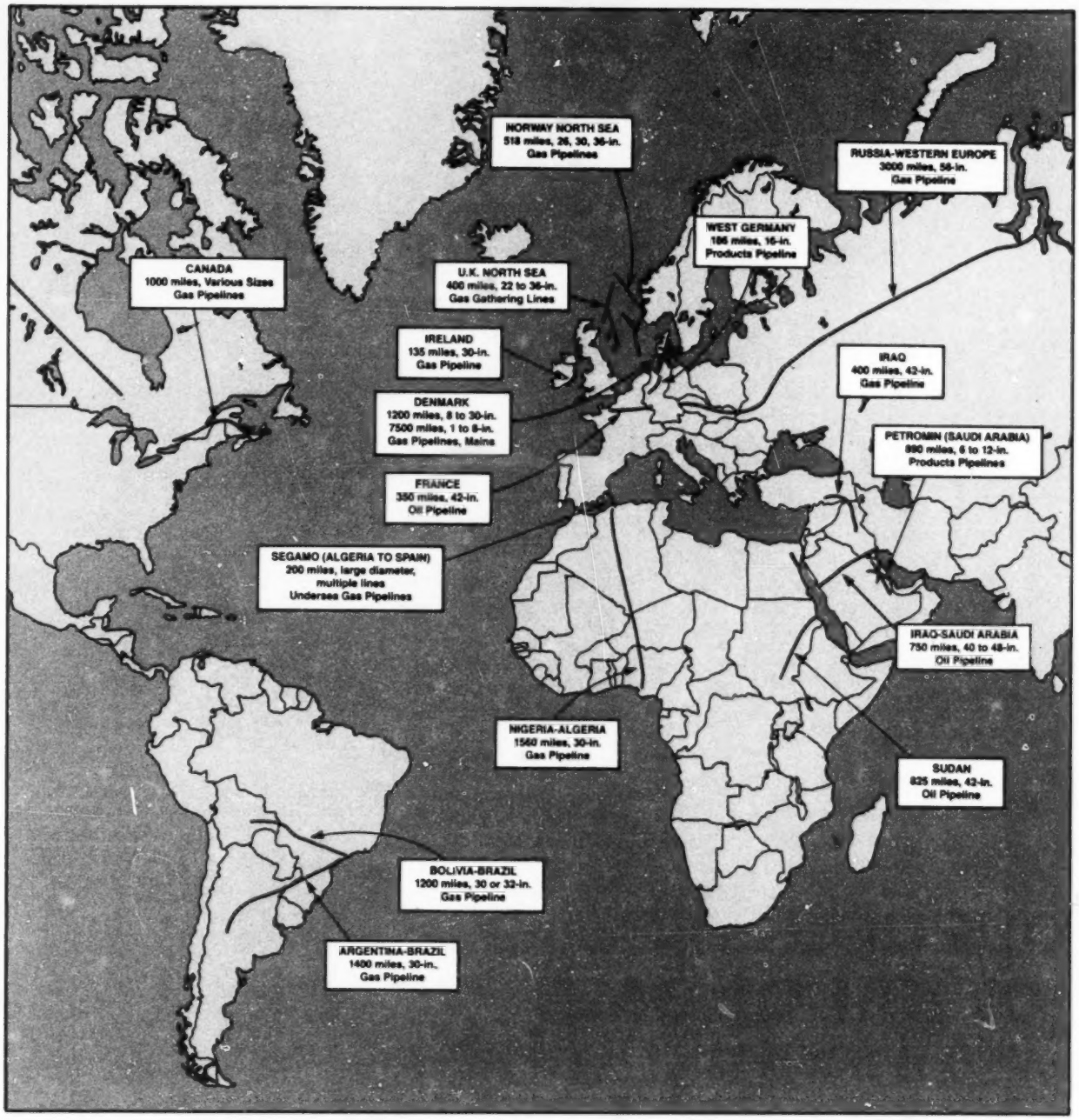

tion from there to Cap Bon. Both are to be completed in November.

Libya's activity includes 363 miles of 4 to 42-in by NKK-Marubeni-Zakhem, 120 miles of 16 and 20-in. by Montubi, and 280 miles of 18-in. by Entrepose. In Zaire, a 205-mile 20-in. products line is being studied by OTP. Sudan's government and Standard Oil of California are reported studying an 825-mile, 42-in. line from Abu Gabra to Port Sudan.

Southeast Asia and Pacific

Petrobangla, national oil company of Bangladesh, will build a 110-mile, 24-in. gas line costing $140 million; project, being designed by PLT Engineering, will also include 50 miles of 10, 16, and 20-in. lines. Thailand has planned a 105-mile, 32-in. line from Texas Pacific's "B" Platform to Union Oil's Block 12 platform, connecting with the newly completed line to Bangkok. Malaysia's principal project is the 80-mile, 36-in. gas line connecting the Sarawak LNG facility in Bintulu to the Luconia Field. In Pakistan, Sui Northern Gas is planning over 1000 miles of 12, 16, and 20-in. lines.

Australia has three major projects to attract pipeliners – the 84-mile, 40-in. offshore line linking the North Rankin field of the North West Shelf to Dampier; the 960-mile, 26 to 32-in. gas line from Dampier to Perth; and the 403-mile, 14-in. gas liquids line from Moomba area to Stony Point in South Australia. Steel has been ordered for the latter line, to be built by Santos Ltd. In New Zealand, design is underway on the 105-mile, 10-in. products line to cost $55 million that New Zealand Refining Co. is building from Marsden Point refinery to Wiri, near Auckland.

South America, Central America, Mexico

Biggest projects currently underway in South America are the 1084-mile Central West Gas project for Gas del Estado in Argentina, being built by Nacap and its associates, and Brazil's 340-mile Campos Basin offshore oil and gas system, now

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Two kibitzing camels survey the desert pipeline scene in Tunisia along the right-of-way of the Trans-Mediterranean 48-in. gas pipeline.

being installed, along with 309 miles of land lines.

A big major project now in design stage is the 1350-mile, 30 or 36-in. gas line from Bolivia's Santa Cruz province to the Sao Paulo industrial region of Brazil. Some 400 miles would be built in Bolivia, the other 950 miles in Brazil. Snamprogetti has a $2.7 million design contract for the line.

Argentina and Brazil also have plans for a joint gas line–a 1430-mile system to move gas from Argentina's San Geronimo area to the Sao Paulo area.

Bolivia has awarded a contract to OTP for design and construction management of 493 miles of 6 and 12-in. products lines from Santa Cruz to La Paz. In Ecuador, work is to get underway in late 1981 on 55 miles of 8 and 20-in. products line; a 163-mile, 12 and 14-in. gas line is currently underway.

In Venezuela, plans are being formulated to install some 1000 miles of 8 to 16-in. insulated hot oil lines in both eastern and western areas of Venezuela.

Design is underway on the 78-mile, 36-in. crude oil pipeline across Panama that will serve to link VLCC and ULCC tankers on the Pacific side to smaller vessels on the Atlantic side (that serve the Gulf of Mexico ports).

Pipeline activity in Mexico, until recently moving at a torrid pace, reportedly has slowed and many projects have been deferred because world demand for oil has declined and Mexico's oil revenues have, as a result, also declined. Pemex reportedly has 2600-plus miles of natural gas and products lines planned, with sizes ranging from 6 to 48-in.

Soviet Union

U.S.S.R.'s energy requirements continue to grow and the most recent (1981-1985) Five Year Plan reflects the need for pipelines to transport oil and gas energy. The Plan calls for

Eye-ball stretching scene from Algeria, showing pipe strung out along ditch on the 393-mile, 30-in line from In Amenas to Haoud El Hamra in southern Algeria, illustrates graphically the loneliness and emptiness of desert pipelining.

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Only a few tumbleweeds mar the the desolate, barren landscape as crews perform coating and lowering-in of 48-in. pipe on Algerian section of the Trans-Mediterranean Gas Pipe Line.

Big pipelaying barge *Semac I*, veteran of North Sea pipelaying adventures, was utilized to lay 11-mile crossing of the River Forth by British Gas Corp.

20,000 miles of gas pipelines, of which 10,375 miles will be 56-in. diameter, plus 7187 miles of crude oil pipelines and 4060 miles of petroleum products lines. The figures do not include the 3000-mile, 56-in. Yamal gas pipeline planned from western Siberian fields to Western Europe.

Progress on the Yamal line proposal has been stymied by financing problems. A recent agreement by German and Dutch banks on financing the project has given it new momentum. Soviet planners have agreed to purchase 400 tractors and air compressors from Japan, and are negotiating with U. K. suppliers for 150 gas turbine powered compressors and compressor station equipment. Pipe for the line would be supplied by West German, Dutch, Belgium, and Italian steel firms.

The Yamal project is expected to materialize because Western Europe will need the gas energy, and the long-awaited Soviet-Iran-European gas exchange deal of several years ago is not expected to be revived for a long time–if ever.

Canada

Pipeline activity in Canada will be intense if a number of major projects can be unleashed. If and when the U. S. finally approves the Alaska section of the Alaskan Highway Gas Pipeline Project, the section of line (48 and 56-in.) across the Yukon and Alberta will be a major undertaking. Meanwhile, work is planned for 1982 and later on the Trans-Quebec & Maritimes project (over 1000 miles of pipelines), the Polar Gas project of 3000 miles to bring High Arctic Islands' gas southward, and expansion of the TransCanada PipeLines system through major looping programs.

P&GJ